

A N  
A C C O U N T

Of several  
New Inventions and Improvements  
*Now necessary for England,*  
In a Discourse by way of LETTER  
TO THE  
EARL of MARLBOROUGH,

Relating to  
*Building of our English Shipping,  
Planting of Oaken Timber in the Forrests,  
Apportioning of Publick Taxes,  
The Conservacy of all our Royal Rivers, in  
particular that of the Thames,  
The Surveys of the Thames, &c.*

Herewith is also published at large  
The Proceedings relating to the *Mill'd-  
Lead-sheathing*, and the Excellency and  
cheapness of Mill'd-Lead in preference to  
Cast Sheet-Lead for all other purposes  
whatsoever.

ALSO

A Treatise of NAVAL PHILOSOPHY, writ-  
ten by Sir Will. Petty.  
*The whole is submitted to the Consideration of our English  
Patriots in Parliament Assembled.*

---

LONDON, Printed for James Astwood, and are to  
be Sold by Ralph Simpson at the Harp in St. Pauls  
Church-yard. MDCXCI.

England  
16



LICENSED,

*March 6th. 1690.*

*Rob. Midgley.*





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To the Right Honourable

*John* LORD *Churchill*,

Baron *Churchill* of *Sandridge*,  
Viscount *Churchill* of *Ay-*  
*mouth* in the Kingdom of  
*Scotland*, Earl of *Marlbo-*  
*rough*, and one of their  
Majesties most Honoura-  
ble Privy Council.

My most Honoured LORD,

**I***T hath been observed by several of  
our late ingenious Writers, that an  
eminent Venetian Ambassador, af-*  
*ter a long residence in England, sayling*  
*homeward, did cast his Eye back on this*  
*Land, and said in his own language, O*  
*A Isola*

Isola felicissima, &c. The happiest Countrey on the face of the Earth, did it not want publick Spirits among them : Nor do I think that the pudet hæc opprobria nobis, &c. was in any Age so justly applicable to England on this account as in the present one, wherein Men generally depraved by a selfish inhospitable temper, do like the Hedge hog, wrap themselves up in their own warm Down, and shew forth nothing but Bristles to the rest of the World, and cry out "Ευχα! when they have found a Stone to throw at an Inventor of any thing beneficial to Mankind, instead of giving a tender helping Hand to the Inventions themselves, and which might with Justice be expected, since few or none come into the World with all the perfection they are capable of,

But, My LORD, tho' this Invention of Mill'd-Lead (how much or little soever I contributed to its first Conception, it matters not, I being at its Birth concerned in a greater share and Interest therein, and the Transactions relating thereto, than any one else, although I willingly then admitted the use of other

Name turn



Names more considerable to give Countenance and Credit to the Work, and to avoid Envy) hath been accompanied with the fate of all Inventions, namely, a peevish endeavour of some narrow-soul'd Men to run it down, yet according to the saying, Unus dum tibi propitius est Jupiter, tu hosce minutos Deos, flocci feceris : Your Lordship with your great Heroical Genius, and your incomparable penetrating Understanding, having surveyed all the circumstances relating to this Invention, and the past Transactions about it, and your having afterward been pleased to patronize the Inventors and Invention, I can easily be unconcerned at the Censures of smaller People who are concerned against it.

My LORD, I have been long since taught by a great Philosopher of the Age, that When Reason is against Men, they will be against Reason, and have sufficiently observed, that the way that most Men take to be cryed up for Masters of Reason, is to make Reason serve them, that is, to serve their turn.

*I am not now to learn, that whoever attempts the settlement of any Question, which would be the unsettlement of any mens Interest, may be suspected to have either an unsettled Fortune, and that like a New-comer to the Coast of such a Question, he comes to settle himself thereby, or to have an unsettled Head, and to be one who knows not that against any thing by which Men get their living they would not own to believe any that came from the dead. Tho' the Proofs for any thing are as clear as the Meridian light, yet where Men are Antipodes to each other in Interest, at the same time 'tis Noon-day with the one, and Midnight with the other.*

*And moreover, Reason as it resembles Gold in being the most valued, so (as one saith) it doth too, in being the most ductile thing in Nature.*

*We know how much Mechanicks depend on the Rule of Rectum est index lui & obliqui; and here it comes into my mind to entertain your Lordship with no unpleasant or vulgar Speculation in Geometry, that Maximus Angulus est recta linea, & minimus Angulus est*

*recta*

*recta linea, the greatest Angle and the least are both the same with a right line.*

*But if it were for the general profit or pleasure of Men to deny that there is any right or strait line, or that any Right Line can be made so much as for use, many would be found to deny it strenuously, and who perhaps either would argue, that there is not in Nature any right Line, and that all Lines are Artificially made by the ducture of some point, or the meeting of two superficies, making the edge of any thing, or the Contact of a Cylinder with a Plain, and that neither of these wayes can produce a right Line, because there is no true strait Superficies, but what has inequality or hollownes in it, and that consequently the motion of any Point upon any uneven Superficies, or the mutual concurrence of two uneven Superficies can never produce an even or right Line, or who else would, if not cut off, yet jogg the Hands of those they found making right Lines, or if they found any made, would either obliterate them, or apply Microscopes to them, whereby*

some inequality or raggedness in them would be discovered, or they would pervert Witnesses to swear, or Judges to decree, that they were not Right Lines, or perhaps they would turn the making of Right Lines into Ridicule, according to the Humour of this Age, or according to the humour of an old barbarous former one, maliciously call it the Black Art.

We know that according to the Seaphraſe one Ship is ſaid to wrong another, that excels it in ſwiftness of ſailing : And thus the Shipwrights and Plumbers may if they please think the Mill'd-Lead Invention hath wrong'd them in doing ſo much right to Shipping and Navigation in particular.

Nor is it indeed poſſible for any New Invention, how profitable ſoever to Mankind, to appear in the World, but that ſuch new Illumination muſt ſtand in ſome Mens light, and obſtruet their pratique in thoſe Arts of life wherein they were expert. Thus there is no doubt but the Invention of the Sea-Compaſs was malign'd by the old dull Coaſters, and that of Printing by the Hackney Writers,  
and

and the excellent Notion of the circulation of the Blood, by the old Mumpsimus Doctors, who being sufficiently at ease by the Circulation of Money and Trade in the Realm; knew how to stuff their hollow Teeth with their Patients Bread, without studying Anatomy; the knowledge whereof hath been enriched by a full third part at least within this last Century, as the learned Dr. Henshaw tells us, in his very ingenious Book called A Register for the Air, printed An. 1677. and wherein he hath published an excellent Invention of a Domicil or Air Chamber; and by means whereof in any part of our Native Soyl we may have the Air as pure as on the top of the Pike of Teneriffe, and made so pure as is not to be found on the face of the habitable Earth.

And thus no doubt but the Goldsmiths and Silver-smiths would think themselves injured by any who could revive the Art of making Glass malleable, which one in Tiberius's time had found out a way to do, and withall so yielding, and such as would rather bow than break; for he bringing a Glass

*Vial to the Emperour to shew his Art, he threw the Vessel against the Stone-pavement, with which blow it was not broken but dented, and then taking his Hammer, he again beat out the dent: But he was secretly made away for his pains, as likewise several Inventors have been by the Dullards who only had the Wit to do that, and the Assassins have thought they might dispatch them as justly as Souldiers think they may deal so with those who come to beat up their Quarters.*

*Yet however the fate of some Inventors hath been to fall at the feet of Envious Plebeian Mechanicks, others of them have had that reward of their diligence in all Ages and Countreys, to stand before Kings; and the Vicegerents of the God of Nature have with peculiar respect treated such as the King of Kings delighted to honour, by imparting the secrets of Nature to them.*

*And such respect hath been shewn to the Memory of useful Inventors by the greatest Princes, that several Historians have mentioned it, that Charles the 5th. with a great Parade of his Attendants,*

dants, went out of his way to see the Tomb of William Buckeld, who ( as it was recorded in his Epitaph ) was the Inventor of the Dutch way of Pickling of Herrings, which is so beneficial to those States, that may make it be said that Amsterdam is founded upon Herring bones : His Countrey-men it seems were so just to him, as to perpetuate the fame of the Invention as well as the Name of the Inventor by a grateful Inscription.

And thus too was the Memory of Ludovicus a Culen, Professor of Geometry at Leyden, honoured by those States, by their taking care that on his Tomb should be engraven his Attempt to find out the proportion between a Diameter and a Circle, dividing the Circle into more parts than Sand would constitute the whole Earth, and yet an Unite was too much, and a Null too little.

I am here minded of mentioning how the Tomb of Peter Pet, Esq; the Master-builder of England ( and whose Ancestors for upwards of two hundred Years have been Master-builders and

principal Officers of the Navy Royal ) records his being the first Inventor of our English Frigats, and of which the Constant Warwick, built by him in the Year 1646. was the first, and which sort of Shipping is variously the most excellent and usefull in the known World.

And it having been the fortune of all the Master builders of that Family gradually to excel each other in their Art, I cannot here omit to take notice how Sir Phineas Pett, the Son of that great Artist, having built fifteen Capital Ships for the Royal Navy, besides many more of the lesser Rate, hath obliged his Countrey with a great deal of admirable Invention in the Fabrick of the Kings shier, a fourth Rate, built by him in the Year 1675.

For whereas all Ships before, since the first use of Navigation, were built by rising Lines, which made not so regular a Figure in the Water, he built that by Horizontal ones, and so contrived the Port holes therein, that most of her Guns might point to one Center, and thereby cause such breaches in the sides of the Ship she fought with, that could



not be stopp'd with Pluggs, and that brought her safe off from her being taken by seven Algerine Men of War, according to the Relation of it in the Gazets I have been inform'd of, and which could not have happened but by her Guns so pointing, making such great breaches in their sides as forced them to draw off. And so much hath the New Invention of the building her by such Lines, contributed to the excellency of her sayling, that I have read it in a relation of the Engagement between her and the Golden Rose of Algiers, so much fam'd for her sailing, printed in London in the Year 1681. that the Kings-fisher much out sail'd that Ship, and having taken her, found so much Water in her Hold, occasioned by the great breaches in her sides, which made her to sink down within an hour after her Capture.

What the great effects of such an Invention may hereafter be throughout the Maritime World, I know not, Capital Ships being now liable to be sunk by Bullets which before they were not, by reason of the multitude of Pluggs and Hands

to apply them, always in readiness, unless a Shot had lighted in the Powder-room, as was supposed to have happened in Admiral Opdam's Ship. But he having done so much impartial Justice to the Invention of the Mill'd-Lead-Sheathing, I am very well contented that it comes in my way here to retaliate to him by the just mention of the matters of fact whereby he hath obliged this Age and succeeding ones, to account him a Benefactor to his Countrey.

And, my Lord, I do think my self the more obliged out of my love to my Native Countrey, to present your Lordship with this glancing View of these two great Inventions, because they are very likely in a short time to come among Panciroll's *Res deperditæ*, without care taken to prevent it; for King Charles the second, who had very great Skill in the Mystery of the Shipwrights Calling, hath been heard to observe it, that the Fabricks of our English Ships did for several Years more and more degenerate from the Frigate way in which the Constant Warwick was built, to the way of our sluggish old built  
Ships,

Ships, and not at all adapted for swiftness of Sailing, and insomuch that the *Constant Warwick* it self being after the Death of the Inventor repaired by another Artist, was in its repairing spoiled of the excellency of its sailing.

*Nor have I heard of any other Ship built by the Kings-fisher's Lines, except the Katherine Yacht. And therefore it is of great importance to the Nation that the Draughts of those three Vessels particularly should be transmitted with great Care to Posterity.*

*I must not here forget to mention, that among the many Capital Ships built by Sir Phinehas Pett, the BRITANNIA is by the concordant Voice of all the curious Judges of Naval Architecture allowed to be the best Ship in the World, and far exceeding in excellency of Building and Strength the great first Rate of France, call'd the St. Lewis, on the which is engraven this proud Inscription, Je suis L'unique de l'Onde, & mon Roy du Monde. An admirable Draught or Sculpture of this Ship BRITANNIA, in four large sheets of Dutch Paper, will shortly be published, with more modest*

*dest but just Encomiastick Verses in Latine, English, French and Dutch under it, which I thinking fit to Copy out on my sight of the Draught, shall here entertain your Lordship with those of them that are in Latine and English, Viz.*

*Ad Navem Britanniam.*

Nomine digna tuo Navis, cui vela  
(Britanii,

Imperii titulo jure superba tument;  
Quid Tormenta vehis? Patrium pro  
(fulmine Nomen,

Fluctibus & terris quo modereris  
(habes.

Tum Cæsar tibi Numen adest dextra.  
(que refulgent,

Majora Æquorei Sceptra Tridente  
(Dei.

Quod Natura potest, potuitve Ars præ-  
(stitit in Te.

Ingenio Artificis, Robora tuta tuo es.

## To the Ship Britannia.

Hail mighty Ship: None hath so just a

(claim

To swell her Sails with great *Britannia's*

(Name.

Thou need'st no Guns, that Name o're

(Sea and Land

Thunders aloud, and gives thee full

(Command.

Thy Prince's Hand a Triple Scepter

(wields,

To which great *Neptune's* Trident ho-

(mage yields.

The Builder's Skill equals thy strength;

(in thee

What Nature could, what Art can do,

(we see.

*I have the rather thought fit to mention the just celebration of this Ship, because some impudent Scriblers of the Coffee-House News-Letters presumed last Summer to scandalize her, as if she were rotten, and disabled*

disabled for Sea-service, whereas in truth she was then only put into the Dock for such necessary Repairs as most of the thirty Capital Ships required, which were built pursuant to the Order of Parliament, but from thence she will be lanch'd out perfectly good, and as strong as ever.

It was a proverbial saying among the Romans, *Moenia Sancta*: And the profane Vulgar, who write their despicable Lyes for Bread, ought not to be suffered to pollute the Walls of our Nation with their vile Pens; and such *Epistolæ obsecutorum Virorum* should meddle with the Gally-foists of my Lord Mayor's Show, and not first Rate Ships: And I believe had any such *pauvres Diables* in France so belyed the Ship *St. Lewis*, they would have been Pillory'd, or Keel-hauled under her.

Our excellent Statesman Sir William Temple (who truly deserves the Name of a publick spirited Man, for the excellent Writings he hath published) in his Survey of the Constitutions and Interests of the Empire and other Countries, with their relation to his Majesty

sty

fly in the Year 1671. mentions the  
 strength of our Shipping, as having for  
 many Ages past ( and still for ought we  
 know ) made us an over-match for the  
 strongest of our Neighbours at Sea ;  
 and speaks of the Dutch having been  
 awed by the strength of our Oak, and  
 the Art of our Shipwrights, &c. It is  
 therefore not without reason, that the  
 Charter of the Corporation of our Ship-  
 wrights hath obliged them not to com-  
 municate their Art to any Forreign Prince  
 or State. But yet when I consider that  
 whereas the Contracts of the Navy-  
 Board for building of Ships did 'till  
 within these few Years past oblige the  
 Builders to build with good substantial  
 English Oaken Timber and Plank, and  
 that such not being now to be had, that  
 word [ English ] is left out, and liber-  
 ty given to build with forreign ; and fur-  
 ther consider, that application was made  
 to the Ministers of King Charles the se-  
 cond by the Corporation of Shipwrights,  
 shortly after his Restoration, with their  
 Proposals in Writing for the preserva-  
 tion and encrease of Oaken Timber  
 ( and Copies of which I have seen  
 under

under the Hand of Sir Phinehas Petts, and many others of the most eminent of that Corporation, and that those Proposals being referred to the then Attorney General, he referring their Consideration to the Navy-Board, Sir William Coventry, Mr. Pepys, Sir William Batten, and the rest of the Commissioners of the Navy, did with great Judgment Report in Writing how and where a sufficient number of Oaken Trees might be planted in his Majesty's Forrests, and that the judicious Report from that Board carryed with it self-evidence of the practicableness of the thing with ease, and that had not so great a Proposition then evaporated, but on the contrary have been vigorously pursued, the Oaken Timber sufficient for the use of the Navy Royal had now been in a forward way to its sufficient growth: For it having been known that Acorns sown, have in the space of thirty Years born a Stemme of a Foot diameter, 'tis obvious how soon they will bear a stemme of a foot and a half diameter, and that such Timber so of a foot and a half, will be sufficiently serviceable in the building of Ships. I say, when I consider those



these things, and fear how few else consider them here, and how many observe and consider them abroad, I think there is too much occasion to bewail our Soils not being fertile with men of publick Spirits.

Whether we shall at this rate come to build with English Oak again before Plato's great Year, I know not : But, my Lord, this that I have said doth speak, ( or as I may say ) cry it aloud to us, that while we have the Mill'd-Lead Sheathing for Ships, without fear of losing it, that he will scarce deserve to be thought a Patriot, who at this time of day, when the Crown hath so little Timber in its Forrests serviceable for Shipping, and hath Lead of our own for Sheathing, would have it unnecessarily send a great deal of Money for Eastland Firr for that purpose, of which the arrival here will be so uncertain, and indeed hazardous in time of War.

My Lord, I intend not to entertain your Lordship with Rhetorical flourishes and Harangues of the usefulness of the Invention of the Mill'd-Lead Sheathing : It is of Age in the World to speak for itself, and it hath had the Honour not only

ly to have great unbyass'd Artists for its Encomiasts, but a great Prince, who had a profound Judgment in the Shipwrights Mystery, I mean King Charles the second : For as soon as Sir Francis Watson had acquainted him with the Invention of Milling Lead for Sheathing, his Majesty was very impatient till he had made experiment thereof, whereupon Lead was prepared by a small Engine, wherewith the Phoenix, a fourth Rate was sheathed by Sir Anthony Dean at Portsmouth, which he saw done with care, the Bolt-heads, &c. being fairly parcelled, as they ought to be in any sheathing ; and after divers Voyages to the Straits, Guinea, and the West Indies, she had her sheathing strip'd at seven Years end to repair the Plank, but not for any defect in the Sheathing it self. Nor could those of the Navy-Board, when at their attendance on the Council with their Complaints of Eight Ships in Twenty, make the least Objection ( though they were fairly challenged to it ) against the Rudder-Irons, Bolts, or other Iron work of the Phoenix ; the which made that judicious Peer, the then Earl

Earl of Hallifax declare, That if of twenty Ships they complained of Nineteen, and had nothing to say against the twentieth, he must conclude it to be the Workmens fault, for if they had done the other nineteen as that twentieth Ship was done, they must have proved all as well as she : The King also at the same time, when they objecting that the Merchants did not use it, which they would do if it was so good a sheathing as was pretended, replied, That the Shipwrights ( whose best Friend the Worm was ) wanted not Skill to discourage them ; yet that their decrying it must soon be discerned to proceed from their interest. And indeed it is obvious how the Shipwrights do influence the Merchants and Owners in the Sheathing and other Repairs of Ships, by their being generally Part-Owners in all the new Ships they build.

Nor is it to be wondred at that the King from the beginning gave all the encouragement he could to this Invention ; for when he considered of the thing upon Sir Francis Watlons first laying it before him, his Majesty pressed him to make effectual  
Prepara-

*Preparation for the Work, saying, It would save him at least 40000 l. a Year in his Navy, the which was not improbable, if it had met with that due encouragement, use and application for Sheathing, Scuppers, Bread rooms, and all other purposes it was capable of, with regard had to the charge and damage that a Wood-sheathing brings to the Plank by the great Nail-holes, which they use to spile up at stripping, and other inconveniences that attend Wood-sheathing.*

*And here it occurs to my thoughts, that his Majesty being occasionally in Deptford yard, as the Workmen were bringing on an ordinary Straits-sheathing with Wood upon one of his small Ships, he asked them why they did not sheath her with Mill'd-Lead, and answer was made, she was a weak Ship, and required strengthening. The King thereupon replied, they had as good have sheathed her with Sarsenet, as such a sheathing to strengthen her, and saying, Lord have Mercy on the Men who depend on that sheathing, if the Ship be not strong enough her self without it.*

*One would think now, my Lord, that after so great a King, so judicious in all Naval Mechanicks had approved the great usefulness of this Invention, and after all his eminent Master-builders ( and who were the only Shiprights disinterested from opposing it, in regard their subsistence depended only on their Salaries from the Crown ) had done so too, it should be some potent and weighty Objection that should be a Remora to its progress. But according to the idle conceit of the Fish Remora, which mens sottishness hath made a vulgar one, namely that it can stop the motion of a Ship under sail, ( and some vain Authors have essayed in print to give reasons for such energy of that Fish; and other Authors have attributed the cause of that Fish's power to that mighty nothing of occult qualities, whereas the true cause of that vulgar Error was what an old famous Naturalist said of that Fish, Flent venti, sæviant procellæ, semper Navem immobiliter tenet; which implies no more, but that notwithstanding any violent Tempests, it always did stick to the Ship immovably ) a superstitious*  
*vain*

*vain imagination of an impossibility, namely, of the Mill'd Lead corroding the Iron-work, through some occult quality, hath been made use of as the Remora that hath hindred the progress of this Invention, when it was so fairly under sail, and had made so good a Voyage for the Crown, as to bring it above Cent. per Cent. profit, besides the great advantage in sailing.*

*But it is no matter of Raillery, to observe that many excellent and most useful Inventions have been run down in the World by superstitious Fancies and Imaginations, and fortifying impossibilities with occult qualities; insomuch that our late Act for burying in Flannel, that was of such benefit to the publick, was once in danger of being run down by an idle Notion of an impossibility that intoxicated the beliefs of the Mob, namely, that the Air was likely to receive putrefaction by Flannels making the Dead to sweat; and as reasonably may the populace here imagine, that the New-River-Water conveyed to dress their Meat through Pipes of Lead, will corrode their entrails, if Lead hath*  
*such*

*such an occult quality to corrode Iron :  
And as well may we be afraid to take  
the Venice Treacle, because of its be-  
ing long kept in boxes of Lead.*

*But your Lordships Judgment is so  
excellent, that it cannot be imposed on  
by a Non Causa pro Causa, or any  
other fallacy ; and that I might total-  
ly avoid the least suspicion of one who  
would impose either on your Lordship,  
or on any of Mankind, while under the  
shelter of your Lordships Name I write  
to the World, I have here fairly and  
candidly set forth the Matters of Fact  
in the Transactions the Settlement of this  
Invention hath occasioned on the Stage  
of the World.*

*My Lord, I know it is fit for your  
Lordships entire satisfaction, and that  
of others, that I should mention what  
ensued upon the Company's Reply to  
the Navy-Board before the Lords Com-  
missioners of the Admiralty. In short,  
one of those Lords, who was likewise a  
Member of the Privy Council, was by  
that Admiralty-Board desired to carry  
both that Report and Reply to the Coun-  
cil-Board : And upon reading the Re-  
port,*

port, his Majesty in Council was pleas'd to referr the whole matter back again to those Commissioners of the Admiralty; and whereupon the Company addressed themselves by the Memorial herewith also published, desiring that for the greater clearness of the matters complained of, that what the Navy-Board or the Company had further to say, might be laid down before them in Writing. It is fit I should here acquaint your Lordship that the Companys Reply was drawn by the excellent Pen of Mr. Pepys, and whom the Author of that most elaborate Book, *The happy future State of England*, doth deservedly call the great Treasurer of Naval and Maritime knowledge, and of the great variety of the Learning which we call *Recondita Eruditio*. And it is no reflection on the Integrity of those Gentlemen of the Navy-Board, who made the complaining Report against this Invention, when I shall say that Mr. Pepys his Character justly renders him æquiponderous to them in Moral, and much superiour in Philosophical and Political Knowledge, and the universal Knowledge of the Oeconomy of the Navy.

But



But before there was any further proceeding, his Majesty thought fit to supersede that Commission for executing the Office of the Lord High Admiral: And the King then taking the Admiralty into his own hands, and the Company having thoughts to Petition his Majesty to hear the whole Matter himself, they were by some Persons newly put into the Navy-Board, ( who had for several Years shewed their approbation of the Mill'd-Lead Sheathing ) advised to offer to that Board a New Proposal to sheath at a rate certain by the yard square, and with an intimation that the Navy-Board would take it more kindly, and that they were by this time satisfied that their former Complaint was by misinformation. This Advice was approved, and a new Proposal laid before the Board, the 20th. of December, 1686. which was much approved by Mr. Pepys, saying, That he doubted not but they would comply with it; and declaring that on his part when it came into his way, he would promote it, as he had a full Conviction ( to use his own words ) that it was a great Service to the King;

and whether for that there was no occasion for a good while to sheath any of the Kings Ships, or by reason of a great deal of peremptory business calling for the time of that Board, or by the Company's happening to be slack in their application, I know not ; but it seems that after a years time that Board was pleased to referr to two of their own Members, Sir Phinehas Pett and Sir Anthony Dean ( who had both of them been Master-builders ) the Consideration of the Company's new Proposal. Nor could the Company wish for more equal Judges of the Mill'd-Lead Sheathing, than those two worthy Persons, who so well understood it, and had formerly done so much right to it upon all occasions, as judging it so much for the King's service : But the Kings service calling them from the Navy-Board to a long stay at Chatham, to which place it stood not with the Company's convenience to repair, and there press them to make their Report ; and a long Sickness seizing on Sir Phinehas Pett at his return from Chatham, and he being shortly after his recovery, employed in a Journey about the King's service in some other

other of his Majesty's remote Yards; or what else being the true Cause thereof, as your Lordship may judge, so it is that the said Proposal, which is herewith also printed lies still before that Board without any further proceedings thereon ever since.

My Lord, I have now let your Lordship see how I have been damnatus ad Metallum in the progress of this Invention: And considering the course of corrupt and degenerate humane Nature, no Inventers can promise themselves a nobler fate, tho' the scene of their Invention lay in a nobler mettall.

For as Sir William Petty well observes in his Observations on the Bills of Mortality, that if the art of making gold were known to one person, such single adeptus could not, nay durst not enjoy it, but must be either a Prisoner to some Prince, and slave to some voluptuary, or else sculk obscurely up and down for his privacy and concealment.

And so churlish hath the generality of Men been to Inventers, whose discoveries have only salved the Phœnomena, that they have been unwilling to give

those a good word who have taught the  
Age great things, yet such where the  
brightness of their knowledge would not  
have the operation of the Sun-beams, in  
putting out any mans Kitchen fire.

And this made the Great Tycho  
Brahe, as to his famed Discovery con-  
sole himself, by appealing from the judg-  
ment of the Age he lived in to that of  
Posterity.

I shall here divert your Lordship, by  
entertaining you in his Study which he  
had in an Island in Denmark by the  
Munificence of his Patron King Frede-  
rick, and where (removing the cover of  
the room) he could as he lay with his  
face upward in the Night time exercise  
his Speculation with beholding the Stars.  
And there he had all the famous Astro-  
nomers painted, and the following Ver-  
ses were added, each to the Picture to  
which they belonged.

Salvete Heroes, vetus O Timochare

(salve :

Ætheris ante alios aulse subire po-

(los.

Tu

Tu quoque demensus solis, lunæque re-  
( cursus,

Hipparche, & quotquot sydera Olym-  
( pus habet.

Anriquos superare volens, Ptolomæe,  
( labores,

Orbibus innumeris promptius astra  
( locas.

Emendare aliquid satis Albategne stu-  
( debas,

Sydera conatus posthabuere tuos.

Quod labor & Studium reliquis tibi con-  
( tulit aurum,

Alphonse ut tantis annumerere Viris.  
Curriculis tritis diffise Copernice ter-

( ram  
Invitam, astringerum flectere cogis  
( iter.

*In the best place Tycho Brahe had set  
his own Picture with the following Ver-  
ses,*

Quæsitis veterum & propriis Normæ  
( astra subegi,

Quanti id, Judicium posteritatis erit.

*Your Lordship who knows so many things, can be no stranger to the fate of Galilæus, who after he had placed the Earth among the Heavens, found so much ingratitude on it as to be made a Prisoner in it for so doing, by no meaner a Man than Pope Urban the 8th. Gassendus tells us of this in his Life of Peiresk, and how Peiresk wrote a Letter to him, to condole with him during his confinement, and employ'd his interest in a great Cardinal to procure his enlargement. Pope Urban, it seems, had wrote an idle Comment upon Aristotle de Cœlo, and Galilæus thought fit to confute him, giving him the Name of Simplicius: But the Pope got his Book condemned by the Consistory as heretical; ab arte suâ non recedens, tho' very unnatural.*

*Thus dangerous a thing is it for a Man to over-oblige the World.*

*And here it comes in my way to observe how Dr. Robert Wood, a person very famous for all Mathematical knowledge, lately trying to salve the Credit of this Age from being thought barbarous on the account of Easter-day being so ill fixt in our Liturgy, hath not been*  
by

by any Author I have met with, except one, so much as quoted for his illuminating us.

The only Person who quotes him for it, is, the Author of The happy future State of England, and he there in p. 241. like a careful observer of the Age, hath these following passages, viz. The great Controversie about *Easter*, that heretofore put all the World in a rattle, and almost shook it to pieces, what a toy is it self now reputed, insomuch that our latest Ascertainers here of the time of its celebration, seem'd not to think it *tanti* to awake when they were about it; and tho' our lately having in our Almanacks two *Easters* in one Year, easily awaken'd the Non-conformists to take notice of it, and to say, that therefore they could not give their unfeigned assent and consent to all and every thing contained in, and prescribed by the Book entituled *The Book of Common-Prayer*, &c. And tho' thereupon a Person of the Royal Society, very profoundly knowing in all the Mathematical Sciences, hath publish'd an infallible way of fixing *Easter* for ever,

( and that it may be no longer a fugitive from the rule of its practice, as it often ~~is~~ at present, nor dance away from it self, as I may say in allusion to the *vulgar Error* of the Suns dancing on *Easter-day* ) and fixing it so as perhaps none else could have done, nor possibly himself any other way, yet hath this great right done to that great day, been by the generality of People not so much regarded as would an *Advice to a Painter*, or such like Composition have been.

*But however, the Doctor having publish'd it but in a quarter of a Sheet of loose Paper, and that may be likely to come among the Res deperditæ, I shall here record that his Invention in his own words, that it may the better be transmitted to the Judicium posteritatis, the present World being not only a kind of Areopagus that sits in the dark, but is also asleep.*



Novus Annus Luni-Solaris, sive  
Ratio Temporis Emendata :

Ita ut Mensis quilibet Initium sumat a Novi-lunio, intra unum plus minus Diem ; & quilibet Annus, intra semimensem ab Equinoxio verno.

I. Incipiat Calculus cum  $\frac{1}{2}^{\circ}$  Martii, 1680.

II. Distribuatur inde Tempus in Periodos, continentes 38 Annos ; viz. 24 ordinarios, ( Mensium duodecim ) and 14 extraordinarios, mensium tredecim.

III. Anni cujuscunque, communes & priores duodecim Menses constent è Diebus, alternatim, 30, 29, &c. Hoc est, primus Mensis, è diebus 30 ; secundus, 29 ; tertius, 30, &c. viz. Impar Luna pari, par fiet in impare Mense.

IV. In Periodi cujuscunque Annis 2,

5, 7, 10, 13, 15, 18, 21, 24, 26, 29, 32, 34, 37, hoc est, in 14 *extraordinariis* Annis, intercaletur *Mensis decimus tertius*, Dierum 31, 30, &c. *alternè* etiam numerandorum: viz. in periodi Anno *secundo*, *Mensis 13<sup>us</sup>* intercalaris habeat 31 dies; Anno *quinto*, 30 dies; *septimo*, 31, &c.

V. Singulis (37 Periodis) 1406 Annis, *inferantur* 14 Dies: Hoc est, 1 Dies singulis 100  $\frac{2}{3}$  Annis; vel potius, in 800 Annis, 1 Dies singulis 100 Annis; & in 606, 1 Dies singulis 101, *alternatim* interponatur.

Quo facto, æquabitur Temporis Ratio in *Secula seculorum*. R. W.

Mensura Mensis *Medii Synodici & Communis* secundum Astronomos, viz.

	d.	h.	'	"	'''	'''
Hipparch. Ptolom.	29	12	44	3	15	44
Lansberg. Vendelin.	29	12	44	3	12	
Kepler.	29	12	44	3	10	50
Copernic. Reinold.	29	12	44	3	10	48
Vieta. Clav.	29	12	44	3	10	43
R. W.	29	12	44	3	10	27
Dechales.	29	12	44	3	10	9
Ricciol.	29	12	44	3	10	
Bulliald.	29	12	44	3	9	37
Tycho.	29	12	44	3	8	39

A

*A rectified Account of TIME,  
by a New Luni-Solar Year ;*

So as the beginning of every  
Month shall be within about  
a Day of the New Moon;  
and of every Year, within  
half a Month of the Vernal  
Equinox.

I. LET the Account begin with  
March 10. 1680. From thence —

II. Let Time be divided into Periods,  
of 38 Years each; viz. 24 ordinary  
Years, of twelve Months; and 14 ex-  
traordinary, of thirteen Months.

III. In every Year, let the twelve first  
common Months consist of Days 30,  
29, &c. alternately; viz. the first  
Month, of 30 Days; the second, of  
29; the third of 30, &c. that is, The  
od Months, of even days; and the even  
Months, of od days:

IV. But in the Years 2, 5, 7, 10, 13,  
15,

15, 18, 21, 24, 26, 29, 32, 34, 37, of every Period, *viz.* in the 14 extraordinary Years, let a 13<sup>th</sup> Month be intercalated, having Days 31, 30, &c, alternately also: *viz.* the intercalar 13<sup>th</sup> Month of the *second* Year of the Period, to have 31 days; of the 5<sup>th</sup> Year, 30 days; of the 7<sup>th</sup>, 31, &c.

V. Let 14 additional Days be inserted every (37 Periods) 1406 Years; that is, 1 Day every 100 Years and  $\frac{3}{7}$  of a year; or rather, 1 Day every 100 Years, for 800; and for 606, 1 Day every 101 Years, interchangeably.

The which being done, will adjust the Account of Time for ever. R. W.

*The Author in that Book mentions his having chosen in the conjuncture in which he writ, to build his Fabricks of Numbers and Calculations on the course foil of Popery and the Papal Usurpations, and that finding that Mens Fancies at that time relished no subject grateful but Popery, he made that the Vehicle of the Notions he meant as Physic to cure their Understandings: And he there hits a blot in the Papal Tenets that was*  
never

never hit before by any Protestant Writer, namely the rendring it to be one of those Tenets, That it is lawful to burn a whole City, in which the major part are Hereticks, expecting such a Discovery should be very welcome to the populace in that Conjunction.

His so much and so often celebrating the Royal Society throughout his Work, was too a stemming of the tide of humour that prevailed with a great part of the Age, who knowing little either of the Old or New Philosophy, or real Learning and Experimental Philosophy, value themselves on the ridiculing and crying down those who advance the same.

And having thus again referred to this book of the Happy future State of England, and to which I do but common Justice in representing it full of most useful Inventions and new Discoveries in Politicks, must too refer to the common fate of Discoverers it hath met with, namely, in finding the World an unteachable Animal. I do not account the Author's great Notion in p. 112. new, namely, That the knowledge of the Numbers of the People is the substratum of all Political Measures: For  
that

*that Thesis those words of the Captain of our Salvation have long since taught the World, namely, What King going to make War against another King, sitteth not down first and consulteth whether he be able with ten thousand to meet him that cometh against him with twenty thousand ? or else while the other is yet a great way off, he sendeth an Embassage, and desireth Conditions of Peace ?*

*But after so great a Minister of State as Myn Heer Van Beuninghen had ( as De Leti hath mention'd it in print ) made the People of England and Wales to be but two Millions : And after so illustrious a Writer as Dr. Isaac Vossius in his Variarum Observationum liber, dedicated to King Charles the 2d. had made the People in England, Scotland and Ireland, to be but two Millions, ( tho both of them probably had read the Observations on the Bills of Mortality wherein excellent fine-spun Notions had made the People about six Millions ) his so largely instructing us out of Records, ( and against which there is no averment ) and particularly out of the Returns of all the*  
Coun-

Counties of England and Wales upon several late Pole Acts; and out of the Numbers of the Conformists and Non-conformists upon the Bishops Survey made in the Year 1676. that the People of England and Wales are above eight Millions ( and indeed that we may probably conclude them to be about ten Millions ) may be said to be an happy New Discovery for us in Politicks, he being the first who evinced it out of Records, and wherein his Benefactorship to his Countrey in the doing it at his own charge, might in the paying of Fees to Clerks and Registers well be thought to surpass the charge of the impression of that voluminous Work; without reckoning in the great charge he must have been at in having accounts of various importations taken by Officers of the Custome-house out of their Books, as particularly in p. 254.

The Author gives well-grounded Accounts of the Numbers of the People in France, Spain, Flanders and Holland: But if he had took the pains to calculate the Numbers of the People in China, Æthiopia, or Tartaria, it had been as acceptable to many of our continuando-

• talkers.

talkers of Politicks, and to some who would take it ill not to be vogue'd for first-rate Politicians, though they never spent a thought about reducing Politicks ad firmam, by Number, Weight and Measure, as this Author hath done.

I shall commend to your Lordship a frequent Conversation with this Book, as containing in it more variety of Political Calculations than you will find in all Printed Books in all Languages : And it is the rather worthy your serious perusal in this Warlike conjuncture of time, because the Author hath in so nervous a Manner given our English World so many New Directions about the Modus of our being furnish'd with the sinews of War, and in apportioning great Taxes with great equality, the want whereof is in effect the only grievance in publick Supplies. And this your Lordship will find if you consult what he hath in p. 192. and out of Sir William Petty's Verbum Sapienti, in Manuscript, viz.



If a Million of Money were to be raised in England, there should be levied on the

M. lib.

Lands ——— 216 viz.  $\frac{1}{3}$  of the Rent.

Cattel ——— 54 ———  $\frac{1}{6}$

Personal Estate — 60 ———  $\frac{1}{6}$

Housing ——— 45 viz 12 d. a Chimney  
in London, 10 d.  
without the Liber-  
ties, 6 d. in Cities  
and Towns, and  
4 d. elsewhere.

People ——— 625 at 2 s. 1 d. per Head,  
or rather a Poll  
of 6 d. and 19 d.  
Excise, which is  
not full  $\frac{1}{3}$  part  
of the mean ex-  
pence.

M. lib.

Total a Million — 1000

There is half as much more paid now  
by the Land-tax alone than in the  
Million distributed on the several Fonds  
above. And by the Rule of Sir W. P's.  
Cal-

*Calculation of a Tax of one Million above six Millions may be raised, and no Man feel it much, if equally laid. And tho' it falls heaviest upon Persons, yet according to it no Man will pay Ciz. tenth of his yearly expence.*

*It is certainly now the Opus diei, and a propos what he had said before in the Page, viz. That he believed that the future State of Christendom will necessarily prompt all Patriots instead of dying to make men unwilling to procure publick Supplies, to bend their Brains in the way of Calculation to shew what the Kingdom is able to contribute to its defence, and how to do it with equality.*

*Your Lordship will find this Book at the Shop of William Rogers, Bookseller, at the Sun over against St. Dunstons Church in Fleetstreet, as I find in an Advertisment thereof in one of the New Almanacks for the Year 1691.*

*I must frankly own that I should not have repented of my expence in the purchase of this Book, had there been great Calculation in it but that in p. 180*

and 189. where the Author Calculates the number of the now living here, who were born since the Year in which our Civil War ended, or were then Children, viz. of such Years as not to have experienced or been sensible of the Miseries and Inconveniencies of the War, and a Calculation of what Numbers of those who lived in 1641. are now dead, and what proportion of those now living who lived in the time of the War did gain by the War, and of the number of such in Ireland and Scotland. The Author giveth a very momentous reason for the finding out these things by Calculation, and the which might well seem impossible to be perform'd. For that Princes and their Ministers being rationally to be steer'd in their apprehensions of the danger of Civil War by the great Rule of Dulce Bellum inexpertis, ought carefully to have their Eye on the Numbers of such inexperti in any long time of Peace.

So little regard hath been had by our great Political Writers to Matters of Calculations and Accounts of the Revenues of Princes, that I have in the great

great Thuanus observ'd but one passage relating to the same, and which by this Author is cited, p. 246. viz. as to the Receipts and Expences of Lewis the 13th. for the Year 1614. ( and in p. 250, out of his own Observation he makes the Expences and Receipts of the present French King more than quadrupled since, as to what they were in the Year 1614. ) and in the so much cry'd up Political Treatise call'd Nouveaux Interets des Princes de l' Europe, and commend- ed by the Author of la Republique des Lettres, there is little or nothing of such Political Calculations contained.

But tho at present in the many such curious Calculations presented to the Age by that Author of the Happy future State of England, he doth as to the Rabble of Readers, Vinum raris præmin- strare, whereas Water would have serv- ed their turns as well, yet I believe its impression on Men of refined thought and sense will be such as to make the way of writing of Politicks hereafter without Calculations, grow as much out of Fashion as the garb of Trunk-breeches.

My Lord, I have herewith for your  
Lord

Lordships farther Entertainment thought  
 fit to publish Sir William Petty's rough  
 draught of Naval Philosophy. The  
 filings of Gold are precious, and a Schytz  
 or hasty Piece of Painting done by a great  
 Hand is of great Value. To have drawn  
 so great an historical Picture of that  
 Philosophy, as he had the Idea of in  
 his Mind, would have took up his whole  
 Life: And he therefore considering the  
 little value the Age hath for such Curio-  
 sities, thought it only worth his while to  
 finish this Piece up at one sitting, and to  
 shew Posterity what he could have done.  
 But in this as it is, the Judicious few  
 will find many a Coup de Maitre, and  
 may instruct themselves thereby in some  
 very considerable principles relating to  
 Naval and Maritime knowledge.

My Lord, I know that Providence  
 hath so disposed of the course of your  
 Lordships Life, as to call you to do things  
 that are to be written of, rather than to  
 read things by others already written.  
 Your Lordships great and successful  
 Courage and Conduct, lately so conspi-  
 cuous to the World in the taking of Cork  
 and Kinale, will employ the Writers of  
 the

*the Annals of our Nation, and adde a further lustre to the Name of Marlborough, which was so much ennobled by your Lordships Predecessor, that the great Poets of the Age crown'd him with their just Laurels, when they said,*

*Marlborough who knew, and durst  
(do more than all,*

*There is one noble Invention that was there tributary to your Lordships success, I mean that of Guns: But as great and noble as this Invention is, (and which was found out by a German in the Year 1378. and whereby the Lives of Men, if we reckon by wholesale, are better preserved in the defence of Cities, and by the fate of Victory being sooner decided in Camps, that hinders Armies from so much butchering one another as formerly) it hath been by snarling Writers of great Name maligned; and because by it some Men were killed by retale, it hath been render'd execrable and diabolical; and that not only by Polydore Virgil, but by Cardan and Melancton.*

*Nor*

Nor need it be told your Lordship how much this Invention hath been improved since its first use. The manner of contriving and applying them hath not been less improved than the way of preserving light for the Passengers in our streets, since the finding out of Lanthorns hath: The only Author I know, who hath recorded the Original of Lanthorns is our learned Antiquary Mr. Gregory, in his learned Notes on Ridley's View, &c. He there tells us, p. 286. That the Inventor of Lanthorns was our King *Alfred*, in whose dayes the Churches were of so poor and mean a structure, that when the Candles were set before the Relicks, they were often blown out by the Wind which got in, not only per *Ostia Ecclesiarum*, but per frequentes *parietum rimulas*; insomuch that the ingenious Prince was put to the practice of his dexterity, and by occasion of this *Lanternam ex lignis & bovinis cornibus pulcherrimè construere imperavit*; by an apt compofure of this Horns in Wood, he taught us the Mystery of making Lanthorns.

*But our New invented Glasses and Lamps, that casting out so powerful and extensive, and withal so durable and chearful an Illumination, as to make Mens passing about their Affairs in the Night not only tolerable but pleasant, have much outdone the Lanthorns invented by our Monarch, in diebus illis.*

*Yet on the publishing of a Paper containing the various uses this Invention might be of to the Nation, and wherein it was mention'd inter alia, that these Lights might for the publick good be employed at the Light-houses, which give directions to Sea-faring People in dark and stormy Nights; and that these Lights being so clear and strong, and continued with so much certainty as might probably save many from Shipwreck, where the usual Coal-fires or Candles often fail, by either not giving sufficient Light, or by the uncertainty of these Lights, subject to so many accidents as doth often occasion the great losses both of Men, Merchandize and Vessels: The Patentees of these New Lights being invited to discourse with those that have the Charge, and re-*  
ceive



ceive the profits of the Light-houses, they said, they thought they came to save their Candles, but since the Oyl necessary to maintain these Lights (though a Pint, which would cost about a Groat, they were told would serve one Lamp burning twelve hours) was dearer than Candles, they declined the use of these Lamps; whereupon the Patentees telling them, they thought the saving of Mens Lives and Goods to be of more importance than the saving a few Candles, desisted from further application.

I might here too instance in the Invention of the Scarlet or Bow-dye, the exportation whereof hath brought us in return so much Treasure, was put to it to make its way into the World through much opposition. And thus is, and was, and always will the birth of every New Art and Science be of difficult parturition, and the Inventors be enforced to cry, Fer opem Lucina, I mean, to crave aid and Patronage from such generous and Heroical and publick spirited men as your Lordship.

My Lord, about eighty Tears agoe the Invention of the New-River-Water was much labour'd, and it was a kind of partus Elephantinus, about ten Tears in bringing to perfection by Sir Hugh Middleton; but Stow tells us of the great danger, difficulty, detraction, icorn, envy and malevolent interpositions it first encountered with.

And indeed it may be said, that after the six dayes Work and Adam's Fall the World was yet a kind of Chaos as to the use and service of Man, 'till necessity and humane Industry set his Reason to work, and by degrees to invent and contrive how to apply and dispose the things he found therein best for his ease and service; and teeming Nature goes still big with new Inventions to improve the things we have, and is ready to bring them forth, whenever Philosophical and Industrious Men lend her their Midwifery: And for this purpose I am thinking, it was a noble and ingenious saying of Seneca, Pusilla res mundus est, nisi in illo quod quærat omnis mundus habeat, Senec. Nat. Qu. l. 2. par. 3. i.e. The World were a poor little thing, but for its affording ample mater

ter of research and enquiry to all succeeding Ages.

My Lord, there is another incomparable Invention that was found out not many Years since, and which without some such Patriotly Hero as your Lordship awakening the Age about it, is likely to fill up the Number of lost things; and it is the New Engine that so much exceeds all formerly used for the eternal preservation of our Royal Rivers, by deepening them, and making them every where Navigable, and taking away all Obstructions and Shelves in a very short time. Sir Martin Beckman, the chief Engineer of England, and as I am informed the ingenious Sir Christopher Wren, their Majesties Surveyor General, have given their approbation thereof; and as likewise did King Charles the second, who was highly pleas'd therewith, and declared after he had seen the working of the Engine, which in his Majesty's presence took up about a Tunn and an half in little more than a Minutes time, that he was perfectly satisfy'd it would answer the end proposed; and that by means of its working horizontally, it

*made no holes, but rather fill'd such as lay in the way of its working, and left the bottom of the River level as it wrought, whereby such inconveniencies would be avoided, as had happened from the common Ballast-Lighters making such great Holes in the River of Thames, and in which several of the Kings as well as Merchants Ships coming to an Anchor, had broke their backs.*

*And his Majesty having been made acquainted that this Engine being sent down below Bridge to Berking-shelfe, where is nothing but hard Shingle, and that after half an hours breaking ground, it rock up at 19 Foot deep, about two Tuns in a Minute and a half, during the whole time it wrought, he said thereupon, That he thought there was no way practicable for the deepening the River of Thames, and removing Shelves therein, but by this Engine.*

*This Engine was invented by Mr. Bayly, an excellent Engineer, and much cultivated and improved to its perfection by the great Expence of Mr. Joseph Cotinge.*

*King Charles the 2d. so often going  
down*

*down that River in his Barges and Yachts, took occasion thereby often to consider the State thereof, insomuch that upon a publick Hearing in Council, that the Lord Mayor and Aldermen had upon their Complaint against Patents that straiten'd the River, and licenced Encroachments on it, he took occasion to speak it openly, that the River was shallower before his Yard at Deptford by three Foot since his Restauration, and that if it should be but a Foot shallower there, his Ships that did ride at Anchor there would be spoiled.*

*But I have heard Mr. Shishe, the Master-builder there, and likewise Sir Phinehas Pett, who was formerly Master-builder there, and afterward at Chatham, averr, that the River is there very near four Foot, if not altogether, shallower than it was at that King's Restauration; insomuch that their Majesties Ships there ( as likewise in the River of Medway at Chatham ) do ground about four Foot before they have Water enough to wind up with the Tide of flood, the which doth very much strain and wring them to their great prejudice, and that if*

there be not a speedy course taken to remove some Encroachments, and prevent all future ones, and the farther stopping up those Rivers with fullage, those two Royal Rivers will be spoiled, and in a short time useless for Capital Ships riding therein, and the Crown be put to immense Charge in purchasing of ground for other Ship-yards, and in making of Docks and Store houses, and building new Dwelling-houses for the Officers of the Yards.

*I remember, visiting my worthy Friend Mr. Briſband, who was Secretary to the former Lords Commissioners for the Admiralty, he entertain'd me with the sight of many Papers in his Office that related to the Applications that had been made by the City of London to that Board, for the preservation of the River of Thames, and one of them was a Paper of the City's Reasons against the Patents for Licensing Encroachments, and straitning that River, and which seem'd to me very weighty, and drawn with such great care and pains, that what Councillor soever drew them, I am sure he deserved a very large Fee from the City,*

*City; and out of which I noted down this Passage, namely, That if that River were ipoiled, the great Trade of England would be transplanted, not to other Sea-port-Towns in England, but to Forreign Parts. Those Reasons mentioning Patents of the Soil to the low-water-mark on both sides the River, infer, That without speedy care taken, the River will be so straiten'd as to become thereby not only useles, but even hurtful to Shipping, by a violent and rapid course of the Tide that will then necessarily ensue: And the City therein Complains of a Lease made of a great part of the Soil of the River, and that the right of the disposal of the Shoar of the River, or the Conservatorship thereof, may by survivorship accrue to a Colour-man in the Strand.*

*Mr. Brisband informed me, that those Commissioners of the Admiralty as well as the Lord Mayor had taken a great deal of pains in the preserving of the River, and that it was incumbent on both their Offices so to do; for which purpose he shew'd me a most judicious and learned Report made by the Judge of the Admiralty,*

miralty, wherein it was said, That the Admiral is by his Office and Patent not only *Custos Maritimarum partium*, but *Custos portuum & Conservator Fluminum infra fluxum & refluxum maris*; and that he is by his Patent empowered to make Sub-conservators, and hath by the Statute of *primo Elizabetha* a concurrency with the Lord Mayor of London in the Conservatorship of the River of *Thames*, and that the Shoar of the River is a part of the River, and ought not to be held by private Persons, as of their own right, but by those Conservators in trust for the Government.

And in fine, that Secretary acquainted me, that there was to be a Survey of the River and the Encroachments on it, to be made by Trinity-house and Navy-Board, with the assistance of Captain Collins the King's Hydrographer: And I have since seen a Copy of that Survey made accordingly, and great pains was therein taken. The great pleasure I have taken in going down that River in Boats and Barges, made me always wish well to the State of it; but the sight  
of



of the Papers before mention'd, inclined me to account it a Patriotly thing to promote its preservation by all the means I could, and gave me occasion to reflect on the great Wisdom and Care of the Publick that appear'd in our Ancestors, when they made the Admiral and Lord Mayor the Conservators of it; after the example of the old Romans, as Gryphiander in his learned Book de Insulis, p. 430. quotes several places out of the Civil Law, to shew, that they appointed their Hydrophylacas, or Conservators of their great Rivers, and deliverers of them from being choaked up with Annoyances and Shelves; and he there p. 441. cites A. Gellius for the ratio retandi flumina, id est, purgandi à Virgultis, arboribusque in alveo Natis, ne impedimento sint navibus, practised by them: And he saith, that simili verbo returandi usus est Nonius quod est obturando contrarium, Turneb. l. 28. advers. 12. And then speaking of the Engines they used to that end, he saith, In quem usum Instrumenta hydraulica deducendis, hauriendisque aquis inventa sunt, de quibus Vitruvius, l. 10. quem explicat  
Turne-

Turnebus, l. 2. *advers.* 22. Gothof. in  
l. 4. c. de Excus. Mun. l. 10. Dalacamp. ad Plin. l. 7. c. 37.

Those Engines are long since gone among lost things : Nor do I think we need wish any other Engine for the purging the River of Thames from Obstructions, than this I have referred to : And according to the common Observation of Providence taking care to send both new Diseases and Remedies into the World in the same Conjunction, and often from the same place, ( as for example the Lues Venerea and Guacum, and Sassafras from the West Indies ) it was worthy of its care for England, that at this time, when this our River, on which depends the Fate of our Nation is labouring under the most critical state it ever knew, and is ready to be destroy'd, to offer us such an Engine for its being restored to such a good Condition of being Navigable, as its Conservators can wish.

My Lord, There is one thing that hath caused most horrible ill effects to this River, and which I have met with no Man who hath observ'd, and therefore  
it

it is fit it should be known; and that is the Fire of London: For every five Yards of Pavement a load of Gravel is used, and a great part of this Gravel lyes so loose, that by the force of the Rain it is frequently driven into the Sewers and the Thames: And every Pavement raiseth the Street paved two Inches at least; but the burn'd part of London is at a Medium four Foot higher: And so I account that by the Fire and Re-building of London, more Gravel and Soyl hath gone into the Thames than perhaps will again in the next three hundred Years.

Some who are interested in this Engine, have said, that by it the Bar of Dublin might be taken away; but I have heard that that is a rocky Barr; and if so, such effect of the Engine is not to be expected: But that such Shelfes arising in our River from the Gravel and Sullage that are wash'd into it, may with ease be removed by it, is not to be doubted.

This River glides along with a much more clear and gentle stream than the River of Severn; and the Cause of the clearness

clearness of its Water, is its running in a Gravelly Valley, and over a clear Ground: And the great winding of the River, which locks in the Water that it cannot make that haste down to the Sea that it would, and the low-lying of the Head-springs of it, from whence there is but an easie descent to the Sea, are the two chief Causes of the gentleness of its Current: It may be here remark'd, that this easie descent of the Waters to the Sea-ward, is another reason why the Tide flows up so high into the heart of this River; for the more steep the River is, the less able is the Tide to force its way up into it. Swift Rivers have always their Heads lying high, or their Course direct, or both.

Since I have been (as I may say) a Student of this River, I have took occasion to pitty those who look on the strange shifting of Tides in this River as a great Prodigy, because happening seldom: But I think the Cause of the shifting of the Tides, is only the over-bearing of their Course, when they are at their slackest, by a Northwest Wind, which is the most powerful adversary they can have on our Coasts:

*Coasts : For if a slow Ebb be encounter'd full in the teeth with a hard Storm, what can follow but a return of the Tide back again ? And if the Northwest Wind either abate its fierceness, or shifte into some other quarters, as the Southwest or North-east for some short time, and then either return to its former place, or resume its former force, and do this once, twice, and again ( which we know is not inconsistent with the Nature and Custom of the Wind off at Sea, tho' at Land its wanderings are not altogether so sensible ) we may easily believe ( seeing so plain a reason for it ) that there will be a playing of the Tide too and fro, and several Floods and Ebbs succeeding one another in a few hours space. My Sentiments in this place are those of the Author of Britannia Baconica. It was the Prediction of Campanella, that Venice should at last be destroy'd by Oblimation, that is, by the Sullage of its Waters that should spoil their being Navigable. And Gryphiander in his Book before mention'd, hath a great deal of curious Learning, to shew what famous Rivers in the World had been destroy'd by*

Ob-

*Obstructions : He in p. 448. cites Ovid for his ——— Vidi factas ex æquore terras. He in p. 177. making the three constituent Parts of a River to be Water, the Banks and Channel, considers the Mutations incident to them all, and in p. 460. saith, Ravenna Italiæ urbs ab Augusto Cæsare portu manufacto aucta, nunc pro flumine spaciosissimos hortos ostendit, malis plena, sed de quibus non pendeant vela sed poma. Ita Paravij, Aquileiæ, & alibi latissima nunc jugera sunt, ubi olim classium stationes fuerunt, &c. Leowerdia, Bosswerdia, aliæque Frisæ urbes olim maritimæ, nunc integro milliari a Mari recesserunt : And then speaks of other excellent Harbours there destroy'd by Oblimation or Sullage. And in p. 177. he hath a great deal of excellent Learning much to this purpose, and saith, Quod si perpetua sit fluminum mutatio, videtur ipse Deus imperij & provinciæ terminos mutatos velle, qui ob hanc causam Moabitis minatur, fluvium ipsum Nimrim exsiccatum iri, Jerem. 48. v. 34. Psal. 107. v. 33. Atque hoc experientia confirmat. De quâ Lucian*  
*in*

*in* Charon. Atque urbes tanquam homines, & quod magis est admirabile, etiam universi Fluvii evanescunt. Inachi enim nullum Argis extat vestigium. *Seneca in Hercul. Oetheo.*

Mutetur Orbis, vallibus currat Novis  
Ister, novasque Tanais accipiat vias.

Inde factum cum ex fluminum insolitis mutationibus præfagia sumerentur de mutationibus imperiorum, ut flumina ipsa ab Ethnicis pro diis colerentur. *v. Natal. Comit. lib. 1. Mythol. 11. Ita Nilus in Ægypto pro Deo cultus. De cujus præfagiis, Seneca l. 4. Nat. quest. 2. And there afterward speaks of the changes of the Channel in the Rhine.*

*He doth often inculcate that Notion, That the administration of the Banks of Rivers is a part of the Regalia; and he in p. 436. quotes a great Writer of the Regalia, to shew that the Work of the Inspection and Conservacy of them is among the Regalia: Sicuti etiam jus retardandi flumina, ripas muniendi, alveumque purgandi: And there saith, Hinc semper potestas statuendi de aggeribus ad superiores pertinuit. Ita Romæ remedium*

dium coercendo Tyberis ex Senatus consulto Ateio Capitoni & L. Aruntio Mandatum, *Tacit. 1. Annal. & Constitutus est in eum usum certus Magistratus ab Augusto Cæsare, Sueton. cap. 37. Nempe curator Riparum, & alvei Tyberis ut inscriptiones veteres habent, Lips. in Comment. ad Annal. Tacit. Tyberius etiam quinqueviros constituit, Dio Cass. lib. 37. Quos titulos usurpare ne principes quidem puduit.*

*This great part of the Regalia, namely, the Conservation of all the Royal Rivers of England, hath been always by our Kings deposited in the hands of the Lord High Admiral of England and Ireland; and the trust thereof is both granted to our Admirals in all their Patents, and is inherent in their Office; and in all the Patents of the Viceadmirals of the maritime Countyes in both Realms, the Viceadmirals are expressly constituted Conservators of all the Royal Rivers and Ports belonging to those Counties, as Mr. Brisband inform'd me upon his having perused the draughts of many Viceadmirals Patents; I thereupon asking him whether those Viceadmirals did put their power*



power of being Conservators of the Royal Rivers in execution; he told me that upon his having consulted some of the Offices and Officers in the high Court of Admiralty about this very thing, he could find no foot-steps of their having minded the Power of such Conservacy: That he observ'd them diligent enough in that part of their Office that enabled them to receive several Admiralty Perquisites and Droits, of the which they were Collectors for the use of the Admiral, and to whom they often gave their accounts about the same; but that he never found in the Accounts of their Disbursements any thing inserted of a Penny charge they ever were at in the demolishing any Nuisances, or removing any Shells in the Royal Rivers; and that the doing this being a thing of great charge, and they having no allowance of any Salary to support their Office, this Work was never expected from them.

Thus then have Enevoachers took what liberty they pleas'd, to make Purprestures on the Royal Rivers in the Countrey, and to build Houses thereon as seem'd good in their own eyes; and it hath there been,  
as

as Gryphiander saith, p. 522. In Corcyraëns propter impunitatem malefactorum jocus est apud Eustat. in Dionys. ἐλευθέρα Κορκυρα, ἥ ἐστι δὲ τοῦ θελήματος. i. e. Libera Corcyra, caca ubi velis.

*But the Secretary shewed me how that in the Finalis Concordia of the 18th. of February, 1632. before the King in Council, between the Common-Law Judges and the Judge of the Admiralty concerning Prohibitions, one Article agreed to, was, That the Admiral may enquire of and redress all Annoyances and Obstructions in all Navigable Rivers beneath the first Bridges, that are any impediments to Navigation, or Passage to or from the Sea, &c. and no Prohibition to be granted in such Case: And from the foremention'd Report of the Judge of the Admiralty to the late Commissioners of the Admiralty, it is plain that the Lord high Admiral in his high Court of Admiralty here, under the eye of the Government, hath variously acted in the Conservacy of the River of Thames; for thence I noted down what follows, viz. It can be made appear by Records in the Court of Ad-*

Cor. Admiralty, that Licenses have been gi-  
 efici- ven by the Lord Admiral for the en-  
 nyf. largement of Wharfs, and that the said  
 Li- Court hath punish'd Persons for not  
 that keeping them in repair, and Orders  
 h. of have been made from time to time for  
 g in the regular lying of Ships, by appoint-  
 Law ing how many shall ride a breast, &c.  
 alty *and the Report mentions, that one was*  
 e a. treated with by Persons concern'd in a  
 may late Patent, that he might be permit-  
 nces ted to take in some part of the Shoar  
 Ri. to the Low water-mark, *and that ano-*  
 are *ther had de Facto agreed with them for*  
 or *the summe of 20 l. for taking in 80*  
 and *Foot deep, and 100 Foot long of the*  
 such *Shoar. I have been by my Council at*  
 Re. *Law inform'd, that he hath seen various*  
 y to *late Patents for granting away the Soil*  
 ral- *of the Shoar to private Persons, not on-*  
 lmi- *ly in Middlesex and Surrey, but in the*  
 ere, *Counties of Kent, and Southampton, and*  
 va- *Norfolk; and that he saw a Deed under*  
 the *the Hand and Seal of the Colour-man be-*  
 oted *fore named in the City's Reasons, the*  
 ade *which Deed was dated the 22d. of Ja-*  
 of *nuary, in the second Year of the late*  
 Ad- *King James; and in which he Covenants*  
 with

*with some Sea-faring People, inhabitants by the Thames-side in Wapping, that neither he nor his Heirs and Assigns will build any House or Wharf on the Soil between their Houses and Ground and the Low-water-mark ; which necessarily shews that he claim'd a Power of so doing if he would.*

*But at the Admirals granting Licenses for the Enlargement of Wharfs I do not wonder, tho' yet there is no doubt but that both the Admiral and Lord Mayor as Conservators of the River of Thames, have administred that branch of the Regalia candidè & castè, and with great precaution, with reports after references to sworn Surveyors, that the River would not be damnify'd by such enlargement of Wharfs, causing any Jettyes to obstruct the course of the Tide in carrying away the Sullage ; a thing that generally happens by the Encroachments that private Persons have presumed to make on the River.*

*And here I shall take occasion to observe, that it is not only possible in some Cases to take in some part of the River without prejudice to it, but it is also probable*

able that the taking in some places of the River would tend to the good of it. The general Rule is, that we may with safety to the River gain upon the hollow Shore, but not on the Convex Shore, or where there are Head-lands; for then it would change the Channel and turn the stream into Eddys; as for example, If the Custome-House-Key should be carry'd further, which is already brought to the Channel, it would be fatally mischievous.

It hath been by several skilful Surveyors told me, that after the Fire of London, they upon the digging the foundation of the present Custome-house, found that it was all such as we call made Earth, and had been gain'd out of the Thames, and therefore it was ( I account ) with great Prudence, that the Conservators of the River consented, that 'till they came to deep Water, it should be gain'd in for the better Convenience of Navigation, that Vessels might float at ebb as they now do at the Custome-house.

The same Surveyors assured me that under St. Magnus Church they after the Fire met with an old Campshot and Wharfing,

*Wharfing, gain'd from the Thames, and that at the same time they were inform'd that there were found Campshots much further from the Thames in digging of Cellars; and whence it may be inferr'd probably, that all Thames-street from Queenhithe downward to the Custom-house, was gain'd out of the Thames.*

*I give no hint of this, that any Projector may take occasion from hence to begg Thames-street. God be thanked, the illegality of granting Forfeitures before Conviction is now out of fashion. All vexatious or prolling Patents are now in the State of damnati antequam Nati: And it must be acknowledged to the immortal praise of that true English-man, Sir George Treby, the Attorney General, that he finding their Majesties Names surreptitiously used in the Prosecution of such a Patent, did that great Justice to the Honour of the Government, and to his own Character, as to cause a Cesset Processus to be enter'd in the Case.*

*When I consider the many Patents, both illegal and vexatious that passed in the Reign of King Charles the second,*

*I call to mind that Maxime, that the King can do no wrong; that is, he can in no Grant cum effectu, injure his People, but by some of his Ministers in the Law passing it, and who in so doing may be said, Violare Sacramentum Domini Regis. I believe that that excellent Prince did in his Nature wish well to the Ease of his People as well as his own, while by the fault of some of his Ministers so many Grants surreptitiously did pass of the same conceal'd Lands, and of Purprestures, and of Lands derelicted, &c. and when after Composition paid by the People to one Court-beggar, he sent another to their doors; and when the suffering Populace, whose pretended Forfeitures were granted before Conviction, were so often tempted to cry out, Quem das finem Rex magne laborum.*

*It was in that Reign excellently well said by the Earl of Shaftsbury, in his Speech in the Exchequer, at Serjeant Thurland's being sworn a Baron there, viz. Let me recommend to you, so to manage the King's Justice and Revenue, as the King may have most profit, and the Subject least Vexation:*

*d* Raking

Raking for old Debts, the number of Informations, Projects upon concealments, I could not find in the eleven Years experience I have had in this Court, ever to advantage the Crown: But such Proceedings have for the most part deliverd up the Kings good Subjects into the hands of the worst of Men. *And Sir William Petty in a Manuscript I have seen of his, of the Trade of Ireland, for this purpose, taking Notice of the several Trades by which People there subsist, speaks of many there driving the Trade of Projectors, and of such who make use of the King's Name, and the Process of the Exchequer, about concealed Lands, to sponge Composition out of such as are willing to buy their Peace; and he having shew'd how much the King is damnified by those Traders, he saith very judiciously in the end, That this Trade doth not add any thing more to the Common-wealth than Gamesters, and even such of them as play with false Dice, do to the common stock of the whole Number.*

*It is here therefore but just to take notice of the Prudence of the Trinity-house, in that after they had on the*



18th. of August, in the 15th. Year of that King's Reign, passed Letters Patents, not only of the Ballast of the River of Thames, but also of all the Wast ground, Purprestures and Encroachments, and Soil to it belonging; they soon found that it would engage them in Controversies with the City of London, and Seamen and Sea-faring People, and therefore surrender'd it, and the Surrender was enroll'd in Chancery the 9th. of December, in the 16th. Year of that King; and on the 24th. of June, in the following Year, they took out Letters Patents for the Ballast alone. But there were Patents passed of the same Encroachments Prior to the Patent of Trinity-house as well as after it; and it may be said, that on those after it, the Patentees came a gleaning, not only after the Reapers, but after the Beggars, since whatever Trinity-house receives, is only for the use of the Poor: However, the Trinity-house in taking out that Patent for Encroachments on the Thames, was made use of afterward as an Example or President in that Reign, for other Courtiers Petitioning for a Grant of the Encroach-

d 2

croach-

croachments on the Rivers Royal in the Out-ports through all England ; and the Petition referr'd found a favourable Report from one of the King's Council at Law, but was stopp'd on the Letters from all the Sea-port Towns in England to oppose it, as likely to be troublesome and vexatious to the People, and of which Letters I have seen the Abstracts.

I thank God for his inclining me to value that habit of mind, namely, of not giving any man the least Offence to get the greatest profit to my self, equal with my Life ; and as those divine words of Tully shew he did with his, viz. Non enim mihi est vita mea utilior, quam animi mei talis affectio, neminem ut violem commodi mei gratiâ, lib. 3. Offic. And were I commanded to write the History of the Reign of any Prince, and therein in proper Colours to delineate any of the Ministers at Law to him who violated the ease of his fellow Subjects, by the illegal passing of Grants of Forfeitures before Conviction, I should transmit his Character to Posterity, in the words of Vir natus ad corruptissimum  
istius

*istius sæculi Genium : But the Genius of the Age is now for the making it self easie by its spewing up such Patents : And the benefit the People find thereby, doth in a modest Computation outweigh all the Taxes they pay to the Government.*

*The Magistrates of our Metropolis are now eased from the labour of going in their Formalities, and with a Parade of City-officers attending them to Whitehall, to seek relief as formerly in the Reign of that Prince.*

*And I may for the Edification of the Citizens of our Metropolis in Loyalty, fairly take occasion here to mind them, that when ( as the Story is in Howel's Londinopolis, p. 19. ) King James the first, being displeas'd with the City of London for their refusing to lend him Money, told the Mayor and Aldermen attending him, that he would remove his Court, and the Tower Records, and Courts of Westminster-Hall to some other remote place ; and an Alderman then ask'd him, if he would remove the River of Thames ? that if the Alderman thought that an impossibility, he was cer-*  
d 3
tainly

tainly far gone in Capon-broth.

For upon a discourse I had with a most skilful Surveyor, on the occasion of my telling him that I thought whoever bargain'd away that part of the Shoar that was before mention'd, viz. 80 Foot deep, and 100 Foot long, for 20 l. sold Robin Hood's Penny worths of it, his Measures agreeing with mine therein, and that many a Man would have given 500 l. for the same; I found on the Result of our Conference how the Crown might grant away but a Moity of the River of Thames, namely, the Shore to the Low-water-mark on both sides, (and which would in effect destroy the whole River as aforesaid) and gain the value of four Aldermens Estates by it.

For thus his Calculation was, viz. to shew that whoever gave 500 l. for it, would gain 200 l. by the bargain. To go into the Thames 100 Foot long below Bridge, will cost a Man 300 l. with the slighter sort of Wharfing. If he goes 80 Foot deep, he hath it fill'd for nothing with rubbish; so then he gives 500 l. and giveth 300 l. more for the charge of his Wharf: And he may gain  
200 l.

200 *l.* by the bargain by the ground-rents, thus, *viz.* He may build forward and backward on the Premises, and may compute the ground rent by 6 or 7 *s.* the front Houses *per* Foot, and 2 *s.* 6 *d.* *per* Foot the back Houses; so then there being in a Mile above 5000 Foot, he will gain in one Mile 50 times 200, that is, 10000 *l.* and the like on the other side; and so proportionably for another Mile on both sides; *Quod erat demonstrandum.*

*There were by the appointment of King Charles the second two Surveys made of the River of Thames, the one of the several depths of the River in its parts below Bridge, perform'd with great Care and Skill by that excellent Mathematical Person, Sir Jonas Moor, and a Copy of which I can direct the Conservators of the River where to obtain for an inconsiderable Charge.*

*The other was a Survey of the Encroachments I before referred to, perform'd by the Navy-Board and Trinity-house, with the assistance of Captain Collins, his Majesties Hydrographer, and wherein I said great pains was taken;*

and a Copy whereof is herewith publish'd for the use of the Conservators of the River, and I can direct them to Captain Collins his most accurate Draught of the River, and most necessary to be had by them: And he in my judgment deserves to be well rewarded with some acknowledgment by the City for the great Pains taken, and Skill by him shewn in that Draught, tending to the preservation of their River: For he hath thereby laid an everlasting Foundation for the easie and certain Prevention of all future Encroachments on the Thames, and which may be this way, and I believe cannot possibly be effected by any other; namely, if the Lords Commissioners for executing the Office of the Lord High Admiral shall appoint the Marshal of the Admiralty, or some other Person, and the Lord Mayor appoint his Water-Bailiff at the mending or repairing of any Wharf upon the Thames, to see a Stake stuck down, beyond which the Repairers of the Wharf shall not proceed; and both of these Officers shall be order'd to demolish immediately whatever shall be added beyond such Stake. Captain Collins his Draught doth  
suffi-

*ufficiently set forth how far the Encroachments went that were made before the Month of October, 1684. the Month in or about which he gave in his Draught, and to which this printed Survey refers.*

*Upon my consulting the Authors that write of the Regalia, to know their sense of the Office of a Conservator, I found this definition of it there, viz. Conservator est qui sine judiciali examine jus aliquod publicum tuetur. Nor is there any moot-point in our Law that need divert our Conservators of the Royal Rivers from the immediate demolishing of Nuisances, sine judiciali examine.*

*For as little as I have convers'd with Law-Books, I find \* that a Nuisance once erected may be abated by any Body, and that before prejudice receiv'd, and that it cannot be granted by the King, nor continued by the King's Grant or Pardon.*

*And therefore when any one buyes a Nuisance, say I, Caveat Emptor: I wish that all Mercy may be shewn to those who have formerly encroached, and even to their old Encroachments, as may be*

\* 1 Crook, 184. James and Haywards Case. Coke 5th Report. 101. Penruddock's Case; and 9th Report. 53. Bettons Case, cum multis aliis.

without Cruelty to the River. But I am inform'd that that merciful Prince, King Charles the 2d. gave Order to the Lord Mayor for the demolishing some particular New Encroachments that were very prejudicial to the River of Thames. He well knew that two parts of three of the Customs come to the Crown from the Port of London: And no doubt but the consideration of that, as well as the National concern of his Subjects, inclined him to endeavour the preservation of that River by the most effectual means; and he being so often upon the River, knew well that it would bear no more Encroachments, it being particularly in the Pool so full of Vessels upon the coming in of the Colleet there, that a Boat can hardly pass. He was sensible that the great straitness of the River already enforced the Conservators of it to permit more Ships to ride a breast there than had been formerly allow'd, and the which might produce the danger of their sailing.

His Majesty and all his People, both representative and diffusive, had been long sufficiently acquainted with the Doctrine of Nuisances, since the passing of  
the



the Act against Irish Cattel, and that a Patent for a Nulance was not worth its weight in burnt Silk: And he hath been often heard to say, that he would damn all Patents that damned the River; and that the granting of things to the Low-water-mark must needs be vexatious; for that the Neap tides and Spring-tides being so various at different times of the Month, and different times of the Year, beside all variety of Wind and Weather from abroad, the great uncertainty of such Grants must make perpetual disturbances among his Subjects; and that if any presumed to rake in the River to what may seem the Low-water-mark, that then Ships lying by the Walls would encroach the Mud there, and add to the dirt thrown in, and that that might be built on too, and so the River be annihilated. And he being inform'd that the Person who had made that Encroachment so prejudicial to the River, and which he purchased for 20 l. was only Fined by my Lord Mayor's Court of Conservacy 5 l. for it, was resolved to have it demolish'd, both for the good of the River, and to terrifie Encroachers for the future;  
for

for that he well knew the demolishing of that one Encroachment would spoil the Market of selling Nufances for ever.

Nor is it to be wonder'd at, that his Majesty was so thoughtful and resolv'd about the preservation of his River of the Thames, since the Care of some Royal Rivers, not so considerable as that, hath been known to take up so much of the time of the Council-Board, when they were much endanger'd by Obstructions and Annoyances. I shall here take occasion to mention what I find in Sir Julius Cæsar's Manuscript Collections of Matters of State, that after King James had granted the Conservacy of the River of Tyne to the Mayor and Burgeses of Newcastle, Complaints were brought to the Council-Board, of the great Decay of that River; whereupon on the 29th. of January, An. 1613. certain Articles were order'd to be put in execution for the remedying the Abuses complained of: And it appearing that that River was in such eminent danger of being destroy'd, if a very speedy course were not taken concerning it, the Council order'd that Sir Julius Cæsar, and Sir Daniel

*Daniel Denne*, one of the Judges of the Admiralty, with the assistance of the *Trinity-Masters* of *London*, should draw up additional Articles to be joyn'd with the former, for the effectual Conservation of that River: *And one of them was*, That some truly trusty substantial Men, Burgessees of *New-Castle*, be appointed to View the River every Week, and to make Oath of the abuses done to the same; two of them to be Masters of the *Trinity-House* of *New-Castle*, and they to have no Coles, nor Mines, nor Ballast-shores, and who might be thought not concern'd for their own profit in casting Sullage into that River.

*The Government then thought not fit to make any Men Guardians of the Soil of that River, who had a pretence by Patents to inherit it.*

*In short, when the Sun is just come into its Winter-Tropic, the dayes begin to lengthen, and not 'till then; and when things were at the worst with the River of Tyne, they did then begin to mend: And the Wisdom of the Government shew'd its Dominion over all the Starrs,*  
*whose*

*whose influences threatened that Royal River : Dictum, factum ; and that River is preserv'd to this day, and so I hope with Gods help will the River of Thames, and all our Royal Rivers be for ever.*

*It was the saying of Maximilian the first, Deus æterne nisi vigilares quam male esset mundo, quem regimus ego miser Venator & ebriosus ille Julius. The Viceadmiral of the County, and the Mayor of Newcastle were in that Con-juncture drowsie Conservators of that River ; but Divine Providence was then awake to preserve that great useful River, and to awaken the Government to take those Measures for its preservation that were necessary, and suitably to which a fac simile might easily be taken on occasion for any other of our Royal Rivers.*

*There is another of the Royal Rivers where the great Concern of Navigation did so worthily employ the time of the Council-Board in the Reign of King Charles the first : For one Morgan having built a House at Crockyern-Pill, in the Port of Bristol, ( and in which place Posts had formerly been erected,*  
for

for Ships and Barks being fasten'd to them ) the Lords of his Majesties Council upon a Complaint of that hindrance to Navigation, made an Order that Morgan should demolish and pull down that Houle, that so Posts might remain there as formerly, for the fastening of Ships ; as may appear by two several Orders made at Council-Board, the one bearing date the 11th. of June, An. 1670. and the other the 29th. of October.

And if any private Person may abate a Nuisance, even before prejudice receiv'd, none need make it a Question whether the King or his Privy Council may, or Persons by them Commission'd so to do.

Because ( as we say ) that which is every body's work is no body's, for that reason the Law hath entrusted that power of abating Nuisances in the Royal Rivers to the Lord High Admiral, as their Conservator, ex Officio ; and here for the doing that in the River of Thames, the Lord Mayor hath been admitted to that trust ; and it is vested in both of their Offices, both by Grant and Prescription, according to that distinction so often used  
among

*among the Writers of the Regalia, cumulative but not privative; that is to say, by the accumulating the power of Conservacy both to the Lord Admiral and the Lord Mayor, neither of them is deprived of it. Neither would either be deprived of the exercise of their Power of demolishing Nuisances, if the King should grant a Commission to many other particular Persons so to do: Nor yet would the Commissioning of many other such Persons deprive the rest of their fellow Subjects of their right so to do.*

*And here it is obvious to be said by the way, that tho' a Patent that pretends to grant Encroachments or Nuisances is void, yet a Patent or Commission to throw them down is most certainly very legal. But yet if any Man were so publick-spirited as without a Patent to attempt a thing so beneficial to his Countrey, he would be able to effect it with as much readines as that honourable Person, who hath on many Accounts deserv'd so well from his Countrey, the Earl of Craven, without Patent or Commission, or a Parade of Officers and gilded Maces going before him, hath been long obey'd in the quenching of Fires.*

*My*

My Lord, I believe the English Nation is doubled in populousness, since the ancient Methods were first used of trusting the Care of Conservacy of the Royal Rivers in the Countrey to our Vice-admirals, whose so long Non-user of their power relating to the Encroachments on them, hath sufficiently appear'd by the many Patents of those Encroachments in the several Countreys granted in the Reign of King Charles the second, and the which hath beside the inconvenience of the straitning those Rivers, produced another to our Navigation, namely, the Creating much trouble by innumerable Law-suits to our Navigators, who generally inhabit by the sides of those Rivers, and where their Ships use to lye : And it is pitty but that some Clauses should have been inserted in those Patents, to direct a different way of Prosecution in their Case from that of other Subjects, and that unless very enormous prejudice had come by their Encroachments to the Royal Rivers, the Seamen might not have been put to it to give Composition-money for the licensing their Nusances. It hath been truly observed

*serv'd by a late Writer, That Seamen are easily tempted to seek good Entertainment in other Countreys, if they find it not in their own, and that they are apt to change their own Quarters, and embarque in Forreign Service, sometimes upon a Capriccio of their reputing themselves disobliged at home, and at other times on their expectance of being better used abroad. And in a Remonstrance from Trinity-house to the Earl of Nottingham, Lord high Admiral, it was certify'd by them to his Lordship, that in a little more than 12 Years after 1588. the Shipping and Number of our Seamen were decay'd about a third part.*

*It seems by the wise Conduct of the Government then, our Sea-men and their numbers were carefully enroll'd.*

*But so indulgent was Queen Elizabeth to the Seamen in her Reign, that we find in the Act of Parliament, 35 Eliz. c. 6. An Act for restraining of New Buildings, a particular tender regard is had to the Seamen; for there it is said, Provided also notwithstanding any thing in this Act, it shall and may be lawful for every*



every such Mariner, Sailor, &c. as shall be allow'd by the Lord Admiral, and the Masters and Company of the *Trinity-House* for the time being, in writing under their Hands and Seals to continue in his habitation in any House that hath been built since the said Proclamation, near to the *Thames-side*, serving only for the habitation of such Mariner, and not to be used for any Victualling-house, nor for any House for any Merchandize, &c. and likewise that any Mariner may hereafter build any House for such purpose, and for no other, on or near the *Thames-side*, so as it may be distant from the very Wharf or Bank thirty Foot, so as People may pass between the said Houses, and the said Bank and the *Thames*, &c.

*I speak not this as if I would have any Mariners make any new Encroachments on any of our Royal Rivers, especially on the Thames, which is already so much straiten'd: But I urge it to shew how the Wisdom of the Government then did make it (as I may say) a fundamental Rule for the Preservation of the River of Thames, that even while encourage-*  
ment

*ment was providing for the Sea-men, ( the Walls of the Kingdom ) yet Houses by the Thames should not be permitted, but by the Allowance of the Admiral, the great Conservator of all the Royal Rivers, and the Trinity-house, first had under their Hands and Seals. Several of the Members of the Trinity-House dwelling by the Thames-side below Bridge, cannot but as they go up and down by Water, take notice of the Encroachments as they are making, and which of them will eminently prejudice the River, and which not, and so are the more proper to be consulted in the Case.*

*And from hence we may Collect this great Document, and so necessary to be thought of again and again, by the Conservators of our publick Rivers, namely, That whatever alteration is made in them, by building on them, thô never so little, ought to be with great Care, and with the use of the *Consilium peritorum*, and not by the arbitrage of private Patentees and their Executors, but by the Publick Conservators, to whose personal Circumspection and Skill that great trust was always committed by the*

the Government; *the Office of the Admiral having never been granted by Inheritance, as some great Offices, viz. the Earl Marshal and Lord Great Chamberlain have been.*

*And there is another instance of the ancient Care of the Government over the River of Thames, that is very memorable, namely, the excellent Institution of the Wardmore Inquest, the which thing hath worthily made the Government of the City of London so famous all over the World.*

*I have read the Articles of the Charge of the Wardmore Inquest, that were in print in Queen Elizabeth's time, whereof the 4th. Article is, Ye shall swear that ye shall enquire and truly present all the Offences and Defaults done by any Person or Persons in the River of Thames, according to the intent and purport of an Act made by our late Sovereign Lord King Edward the 6th. in his High Court of Parliament, and also of divers other things, ordain'd by Act of Common Council of this City, for the redress and amendment of the said River, which as now is in great decay*  
and

and ruine, and will be in short time past all remedy, if high and substantial Provision and Help be not had with all speed and diligence possible, as more plainly appeareth in the said Act of Parliament, and the said Act of Common-Council of this City.

*Here the most grave and substantial Citizens, are put to it by a promissory Oath to stake their Eternities, and in effect to invoke God, both as Witness and Revenger, about their doing right to that River in their Presentments; and I am sure the present State of it being conformable to the Words, in that Article relating to its great decay and ruine, &c. is what they may safely swear in an Oath assertory.*

Howel in his *Londinopolis*, p. 392. speaks of this Article still continuing in Presentments in the Wardmote Inquest.

*When the Government did anciently order the Lord High Admiral and the Lord Mayor to espouse the Interest of this River, our Monarchs did not present to them, as one did who told a Roman Emperor, he offer'd him a Lady,*  
who

who was Vidua & indotata. As much as it hath been (as I may say) widdowed, and bereaved of that Care it should have found, while many now living remember at least a fifth part of it to have been taken in by Encroachers, it brings in still a very fair and plentiful Dowry to the Lord Admiral and Lord Mayor. The Lord Admiral hath been by it enabled to support the Trinity-House by the Ballast-Office; and I in my Conscience think it well bestow'd on them, that is to say, on the poor Seamen whom that excellent Corporation relieves thereby.

The Chainage of Ships belongs to the Admiral, and the right of the Ferriage over all Rivers between the first Bridges and the Sea is a Perquisite of Admiralty, and the right thereof is inherent in the Office of the Admiral; and 'tis notorious that the Right of the Ballastage in all the other Royal Rivers of England belongs to the Admiral, as well as in the River of Thames. There is the Perquisite of Anchorage in the Thames, as well as elsewhere, belonging to the Admiral, as are likewise many other Perquisites, and that are enumerated in the Admiral's Patent.

Nor

*Nor can any Right belonging to the Admiral be pass'd by the Crown under the Great Seal to any one but by the Admiral's Warrant to the Attorney or Solicitor general.*

*To the Lord Mayor as Water-bayly and Conservator of the River of Thames, several Fees and Profits belong : And to that Office of Conservator belongs the Office of Measuring Coals, Grain, Fruit, in the Port of London, with the Fees belonging to it ; and the Fines imposed in his Court of Conservacy, or by the Commissioners of Sewers for Misdemeanors that concern the River ; and other Perquisites, and in the which the Admirals have long ceased to intermeddle ; and not without cause, because of the great Charge incident to the Lord Mayor's Conservacy of the River, and particularly in matters relating to the Fishery, and the charge that attends the traversing Indictments, and removing them to the Kings-Bench, as likewise the Charge of suing out Scire Facias'es to vacate the Grants of particular Persons that entrench on the rights of the Lord Mayor's Conservacy, and which Charge they have*

the have often supported without being there-  
the in assisted by the Lord Admirals.

I might instance in many passages in the  
reigns of our Kings long ago, concern-  
ing the Lord Mayor's applying to the Go-  
vernment, when private Courtiers had  
surreptitiously obtain'd Patents that in-  
terloped in the Conservacy of the Ri-  
ver; as for example, Edward the 4th.  
having made a Grant to the Earl of Pem-  
broke for setting up a Weare in the  
River of Thames, and the Lord Mayor  
applying to the King about it, obtain'd a  
Scire Facias to vacate that Grant, and  
vigorously prosecuted the vacating there-  
of to effect.

And how in the two last Reigns sever-  
al Lord Mayors with great Industry and  
Charge prosecuted the vacating of Patents  
that they judged entrenching on the Con-  
servacy, that both by Charter and Pre-  
scription belong'd to them, is known to  
every one: Nor will the unwearied dili-  
gence of those Patriotly Lord Mayors,  
Sir William Pritchard, Sir Henry Tulse,  
Sir James Smith, Sir Robert Jefferys,  
Sir John Peak, in thus shewing their  
Zeal for the Conservacy of the River,

be ever forgot, while that City keeps Records.

And they are strangers to the Character of the present Lord Mayor, both for integrity and prudence in Political Conduct, and his Zeal for maintaining the known Rights of the City, who shall think that if he had been at the Helm of the Government of the City when they were, he would not have steer'd the same Course as the most active of them did, and that with such a Courage as is worthy the high Sphere of Magistracy he moves in. A Coward (saith one) cannot be a good Christian, much less a good Magistrate. Solomon's Throne of Ivory was supported by Lyons. Innocency and Integrity cannot be preserved in Magistracy without Courage. Magistrates are great Blessings, *Modo audeant, quæ sentiunt*, if they dare do their Conscience.

*Me quæ te peperit ne Cesset Thorna tueri,*

was the ancient Inscription of the Bridge-house Seal, and which may give an occasional hint to any Citizen of London, advanced to Authority and Opulency there.



therein, to wish well to the defence of that River that hath so long bred and preserv'd the Riches of that City.

I am here led to observe, how that River being pester'd by various Annoyances in the Reign of Henry the 8th. and the Lord Mayor's Officers being made uneasie, and hinder'd in the Conservacy of the River; the City apply'd to the King for a Proclamation, who accordingly issued out one in the 34th. Year of his Reign, strictly requiring, That none should presume to resist, or deny, or impugne the Lord Mayor or his Deputies, in doing or executing any thing that might conduce to the Conservacy of the River, &c.

And methinks the Customary yearly Solemnity of the New Lord Mayor's attended with all the City Companies in their Barges on the Thames, and there on that River above Bridge having their first Scene of Triumph, as they are going to Westminster-Hall to be sworn, should give them occasion to think often of that Rivers preservation in the following part of the Year.

*I am here led to call to mind a fatal danger that that River above Bridge escaped in the Reign of the late King, when some were so hardy as to offer him a Proposition, and in the way of a Project to enlarge his Revenue by straitning the River, and by building another Street, between the high and low-water-mark, from the Bridge to White-Hall. But tho' so great a straitning of the River there would not have been so prejudicial to the publick as lesser straitnings of it below bridge, where the great Scene of Navigation lyes, yet his Majesty with great judgment gave a peremptory denial to the Proposition, for this particular reason, namely, that such an alteration in the River might perhaps produce an alteration in the Tide of Flood, and be the cause of its not flowing so many hours as it doth, and which effect too he thought the building of a Bridge at Lambeth (a Project that some offer'd to his Consideration) might produce, it being obvious that the Obstacle the course of the Tide meets with by London Bridge, doth much occasion the Tide of Flood being the shorter.*

*And*

And if great Care had not been taken by the Trinity-house, in the government of their Ballast-Lighters, and ordering them not to draw up Ballast too near the Banks of the River, there would have been great danger of another accident that might have curtail'd the Tide of Flood; I mean by their coming nearer to the shoar than the safety of the great Level by Limehouse will admit. . In the same time that they can draw up one Tun of Ballast in deep Water, they may draw up three near the shoar. A breach in that Level did within these few Years cost the Proprietors 25000 l. a third part of the value of the Land: And if a new greater breach came, perhaps it would not be repairable, and possibly cause the Thames not to flow up so far as it did, and yet doth. But any thing of this Nature we may well hope will be prevented by the excellent Management of the Ballast-Office, by the industry of that Virtuous and Prudent Lady, the Lady Brooks, who hath the Lease thereof from the Trinity-house, and hath taken much more Care of its being managed for the good of the River, than was took formerly.

*I forgot when I was just now considering the Affair of the Annoyances and Streightning of the River above Bridge, to mention it, that a Gentleman of the Temple, who has not been many Years a Barrester, told me, He remembers that since he was of that Society, the River at low-water came up so far as to touch the Garden-wall; and every one knows at what great distance it is now from the Wall at low-water.*

*My Lord, I have here given your great active thoughts the best entertainment I could upon our Royal Rivers, and particularly on the Thames. Great men are like the heavenly bodies that find much veneration but no rest, unless we find a Salvo for their having the latter, by saying what the Philosophers do of the Heavens, that Movendo quiescunt. And whoever will be just to your Lordship, must acknowledge that you have esteem'd your self most at your ease and rest, while in the high Orb Fate hath placed you in, you have been most active and busie in blessing the World with your influences. Your Lordship need not be directed*

rested to that Moral remark, that your private good is included in the publick, Tanquam Trigonum in Tetragono. And as in Nature we see that all bodies do by their own proper Center tend to the Center of the Universe, so they that know your Lordship, know it is natural to you by your tendency to your own Welfare and Happiness to endeavour to promote the bliss of your Countrey in all the wayes you can.

Your Lordship is no stranger to what the Roman Poet saith of Cæsar,

———— media inter prælia Cæsar,  
Astrorum Cœlique plagis, superisque  
( vacabat.

And therefore if his great mind could in the heat of Battel find leisure to employ it self about the imaginary Circles in the Heavens, and which only save the appearances, I believe if presently after you had charged in a Battel, I had hinted to you some of the great matters before mentioned, that are as real as those three great Foundations of real Learning can make any thing, I mean, number, weight,

*and local motion, and matters on which the Salus Populi doth absolutely depend, your Lordship would have given me the hearing. And having said this, I shall not doubt but that now you are by Providence brought to support the Crown and your Countrey, by the great Figure you make in the Council and Parliament, and in the peaceable administration of the Civil Government, your Lordship will therein be as vigilant for the publick as ever you were in War.*

*Nor to a Soul so refined as your Lordships could any War but what is in order to Peace seem eligible; and when in the Case of any degenerate stupid Members of Mankind, who are deaf to all Reasons for their being happy, or suffering others to be so, you are call'd to awaken the World out of its Lethargy with the sound of Drums and Trumpets. But it is an easier and gentler way of awakening any of our Magistrates, whom you may judge to be sometimes drowse in the Administration of those great trusts reposed in them by the Government, that I here most humbly offer to your Lordships thoughts, and particularly as to the publick concern*  
in

*in the Conservacy of the publick Rivers, and the Care of which in this growth of the populousness of our Countrey, and overgrowth of the abuses done to those Rivers, may well call for the Supervilorship of some particular Person or Persons, who either being Commission'd for their Conservacy under the Crown, or the Commissioners of the Admiralty may really Conserve them.*

*Nor need the Vice-admirals Commissions on this occasion be alter'd. Let them be nominal Conservators still, and real ones too as far as they please. Nor need any the least deduction be made from, or intrenchment on any Fees taken by the Lord Mayor's deputy Water-bayly or Sub-Conservators for the River of Thames, as I find him styled in that Book of Howel, where he p. 35. treating of the State of the Lord Mayor, saith, He hath a Sword-bearer, Common-hunt, and Common Cryer, and four Water-Bayliffs, Esquires by their Places; whether he there makes three too many, I know not, I have formerly heard of one too many. But tho' neither Mayor nor Admiral can erect a New Court of Justice*

without an Act of Parliament, or Letters Patents from the Crown, yet common reason tells us they may make as many Sub-Conservators or Deputies for the Ministerial work in the Conservacy of the River as they please. And if any one publick-spirited Man were either by the Crown or Admiral entrusted with the Conservacy of the other Royal Rivers, he might for each of them employ what hands he pleas'd. Quod quis per alium facit per se facere videtur.

According to the vigilance and prudence of the former Commissioners of Admiralty, in effecting the before mention'd Survey of the Encroachments on the River of Thames, and likewise the Draught of the River by Captain Collins, the like Surveys and Draughts of all the other publick Rivers beneath the first Bridges, may in a Years time or thereabout be prepared, the which draughts of the respective Rivers being fairly set out in Frames, may usefully be hung up as Ornaments in a Gallery in the House of such general Conservator for the time being, and be left to his Successors to have the Custody



study of. And to such Draughts recourse may easily be had by any of their Majesties Ministers of State, or Officers in the Admiralty Court or Navy, or by the Trinity house, upon occasion. Such Surveys and Draughts being skilfully and accurately prepared, and some Elbows of Wharfs and Jettys being taken away, whereby the sides of the Rivers may as much as is needful come toward the shape of a right Line, the Course of the Rivers themselves will begin to Cure them of their Sullage; and such Eddys as caus'd the Water to settle with the mud formerly be prevented: And these Draughts of the Rivers serving as the Standards by which all future Enlargements or Diminutions of Wharfs or Banks may be guided, will make it appear as absurd for Encroachers to break in upon them thus reform'd and regulated, as it doth to Clippers to incroach on our curious new Mill'd Moneys and the Letters about their Edges, and as absurd for any to begg Patents from the Crown to take in the Lines of our publick Rivers, as the Letters of our Coyn.

And

*And thus after a little diligence and resolution employ'd in the first settling of this work, the constant Conservacy of all our Royal Rivers, would be comparatively easie, the populace seeing that the Government was in earnest in the thing, and as it appear'd to be in the Conjunction before mention'd, when the Magistracy did rouse it self for the preservation of the River of Tyne.*

*Who would have thought that after the Survey of the Encroachments on the River of Thames, and the Draught of that River by Captain Collins, they should be no more minded than if such a Survey had been made of the Annoyances of the Rhine or Texel?*

*Would any one think that after the vast pains taken by the Trinity-House in going down the River to perfect its Survey so many times, in the extremity of Winter-weather, and many of them being Veteran Seamen, thereby contracting dangerous Colds, Coughs and Catarrhs, because the Government required the Survey to be made with all expedition; and after that excellent Seaman and Hydrographer, Captain Collins, had in order*

to the making his Draught of the River exact, made so many weary steps in the mud of the shore, yet many Summers after Summers should pass without any thing brought to effect for the good of the River, or the abatement of one Causeway or other Nuisance, and both Survey and Draught be no more regarded than an old Almanack calculated for the Meridian of Paris or Madrid? Nay, which is more, can it be imagin'd that Captain Collins, a Person of great integrity, should relate it to another such Person, That he within this Year or thereabouts, going to see the sides of the River formerly survey'd, and to find what effects the Survey and his Draught had there produced, that he there found Stone-wharfs built into the Thames for three or four hundred Foot in length, and from ten to thirty Foot in breadth; and that he found a great many other smaller Encroachments on both sides of the Water, and several new Causeways, which in time would raise the Mud equal to the superficies of the Causeways; and that he acquainting the City-Officer entrusted with the Care of the Concerns of the River.

River therewith, had from him instead of thanks a ruffianly Answer? yet these very words of the Captains speaking were Noted down from his Mouth by the Person to whom he spake them. Thus is the Case of the Rivers Survey and Abatements of its Nuisances, like that in the Epigrammatist,

( perci

Eutrapelus tonsor dum Circuit ora Lu-  
Arraditque genas, altera barba subit.

*His dilatory Shaving occasion'd a New  
Beards forth coming.*

But that the Watermen may have no cause to complain that they cannot Land nor take in their Fare, if they may not have that use of the Causeways that the Survey mentions as prejudicial, I shall here say, that both their Fare and they may be accomodated as well below Bridge as above, by the Use of a Truck or Board with Wheels at the end next the Water, to move too and fro as the Tide comes in or goes out, which may answer their purpose.

And if those to whose Care the Conservacies of the Rivers are entrusted as  
Depo-

Depositories, may happen to tell your Lordship that they are not at leisure to mind the vigorous discharge of this trust, a Reply may be had from the trite passage of King Philip's telling a Complaining Woman that he had no leisure to do her Justice, and on which occasion she said, that then he should have no leisure to be King. Most certainly he who receives a Depositum, obligeth himself to be at leisure to preserve it: And I never knew any Judge but who would find leisure to amplify and enlarge his Jurisdiction, especially when he saw any Men find leisure to try to diminish it.

There was one thing that seem'd to be of some moment for the discouraging any one from a belief of the likelyhood of any of the Encroachments on the Royal Rivers being shortly removed, or of the event of any Person of Honour or Quality's being likely to undertake to serve his Countrey therein; namely, the want of any Fonds to support the Charge of such Office. But as to which, it is obvious to consider that the Law is open to compel Encroachers to be at the Charge of abating their own Encroachments, if able to  
do

*do it, and wherein such especially who after the Survey made Encroachments on the Thames, will deserve little Favour.*

*And in the Case of Insolvents, the Encroachments of solvent Persons that shall by the Conservators be permitted to continue, as consistent with the safety of the Rivers, may easily be made to bear that charge.*

*I remember a Person employ'd by some of the late Kings Ministers to discourse Sir Robert Jefferys, when Lord Mayor, about this Matter, acquainted me that Sir Robert then moved it to the Court of Aldermen, That a Committee thereof might be appointed to meet at his House with that Person, and be there offering it to their Consideration, as the sense of those Ministers, that Commissioners should be appointed by his Majesty to make moderate Compositions with the Owners of such Encroachments as were not very prejudicial to the River, and were to be continued, and the Charge of the demolishing the prejudicial ones might be defray'd out of such Composition, and that*

that he desired to know whether they had any thing to object against it. The Lord Mayor and the rest of the Committee unanimously declared that they were very well pleas'd with the Proposition, and did thankfully embrace it.

*And no doubt but if the like way of Compositions were order'd for such Encroachments as are to continue in the Royal Rivers in the Countrey, the charge of the demolishing some there, and of the regulation of those Rivers, might not only be thence defray'd, but a considerable summe of Money might be thence brought in to support the Charge of the Government, and that without any gain-saying or reluctance from the People, provided that they might be deliver'd from the vexatious Prosecutions of the many Patents to private Persons for such Encroachments; to whom they have been in a manner forced to give Money to redeem their Vexation, rather than out of hopes that they could buy a good Title for the continuance of their Nuisances. And certainly the Condition of the French Subjects being so ill on the account*

count of their being forced to buy Salt' any Mens being harrafs'd into the buying such insipid things ( or as I may rather say noxious ) as Nusances, is a more compassionable Case. This is humbly offer'd to the Consideration of the Lords Commissioners of the Admiralty, in order to their offering it to the Considerations of their Majesties, or of the House of Commons, ( who are the grand Inquest of the Kingdom ) or of the House of Lords, as they shall see occasion. And perhaps if by their Application, a Clause may be inserted in some new Act of Parliament, for the continuance of Peoples Encroachments that shall be compounded for by Commissioners in the respective Counties named in the Act, or by their Majesties, they being by the Legislative power secured in their Titles to such Encroachments, will no doubt be chearfully ready to pay near the full Value thereof.

The common Observation, that Prerogative in the Hand of the Prince is a Scepter of Gold, but in the Hand of the Subject a Rod of Iron, is apparently applicable to the Case of the Jubile  
such



*such People will have, when freed from the Vexations by Colour of Law given them by the Proling litigious Instruments employ'd under such Patents, who are usually the Fæx Populi, and may well bring to our minds the saying of Solomon, A poor Man that oppresseth the poor, is like a sweeping Rain which leaveth no Food.*

*I have been inform'd from Mr. L. J. a worthy Bencher of the Temple, that the poor People were so miserably harras'd by the Agents employ'd in the Lady S—ll's Patent for derelict Lands, about twenty Years since, that the Court of Exchequer, burden'd with Complaints about it, Order'd, that no Process of the Court should be further issued out upon it.*

*I do studiously avoid the naming of other Patents or the Patentees, or any of their Instruments or Agents, and do not desire to give our Admirals any trouble with reflections on such, however yet in the course of my little reading in Parliament-Records, I find that many Persons have been censured in Parliament for taking out and procuring illegal and vexatious Letters Patents from the Crown. The Case of Sir Francis Mitchel*  
for

*for his procuring a Patent of forfeited Recognizances before Conviction, is fresh in Memory.*

*Nor shall I here mention the Names of those Patentees particularly, who gave multitudes of the Seamen so much trouble at Law by their Patents for Encroachments, while they knew there were Prior Patents in being for the same Encroachments, and that therefore no Action was then maintainable by the latter Patentees, and that they could have no design by bringing their innumerable Actions against the Seamen, but to get Composition out of them.*

*Nor shall I mention the Name of a Waterbailiff, who was reflected on in Council in the two last Reigns, for having the Encroachers on the Thames for his Tenants, and whom a late Lord Mayor reproved very worthily on that account. Nor shall I name a later Lord Mayor, who instead of being a Conservator of the River, appear'd as a Patron of Encroachers, by effecting it that a Ring-leader of the Encroachers should be fined only a Noble for an Encroachment, that in the Survey of the Navy-Board and*  
Trini-

Trinity-house is particularly branded with its dimensions as prejudicial to the Thames, and his being suffer'd to continue that Encroachment; and the which Favour his Lordship was known to shew him at the request of a Person who was by Name reflected on in The City Reasons before mention'd, as an Encroacher of their Conservacy. The words of the wise are heard in quietness; and I therefore desire not to ruffle the Cares of any of our Magistrates, from whom the redress of these evils may be hoped, by the noise of the Names of Persons. I desire that they may please to look forward, not backward, and that at things rather than Persons, & nequid detrimenti capiat publicorum fluminum Conservatio.

And here it falls in my way to observe, that supposing the Conservators should not think it necessary in haste to abate any Nuisances, or to effect the raising of any Revenue for the Crown, or Fond for this Office on the Encroachments, yet may the charge of the Office before mention'd be competently supported out of Admiralty Perquisites, either as they are already vacant, or as they shall be; and such

such Perquisites as to common reason may seem most proper to be apply'd to a publick use, and as I before mention'd how the Ballast was. The truth is, considering how little the standing Fees of the Judge and other Officers of the High Court of Admiralty are proportion'd to the great pains by them taken, and trust in them reposed, and for how much a greater income than yet belongs to Trinity-house, that is so useful a receptacle as to the Charities to be bestow'd on decay'd Seamen, and their Widdows and Orphans, and where they are to such with so much exact Care apply'd, I have been much troubled when I have heard of Admiralty Perquisites bestow'd formerly on Courtiers and Voluptuaries, by whom the Admiralty Office and Jurisdiction, and the moral Offices incumbent on the same, have not been promoted one jot.

But since the Nature of things doth Call so loud for the speedy Settlement of this Office, by which means only the Trust in the Admiral's Office can be discharged for the prevention of future Encroachments on the Royal Rivers, and for that frustra differtur remedium quod est unicum,

unicum, it may be worthy the Care of those honourable Persons who administer that Office, to see some support provided for that Office as soon as may be, and to apply to the Crown or the Legislative Power, as they shall find occasion, for any thing to be done, necessary to the settlement and support thereof.

Both because the River of Thames is the most principal of the Royal Rivers, and for that the Countrey is naturally in all things influenced by the Example of London, the effectual Conservacy of its River may well seem to require the Priority of their Care. And here after the example of the Government, that as was before mention'd provided A. 1613. for the preservation of the River of Tyne, that the Persons who were appointed to View that River, should every Week make Oath of its State, and the Abuses done to it, perhaps it may appear necessary, both to the Commissioners of the Admiralty and the Lord Mayor, to apply to the Parliament that a New Form of Oaths may be enjoyn'd to all Persons ministerially concern'd in the Care of the River of Thames, and the  
which

*which kind of Oaths may likewise be enjoy'd to Persons employ'd in the Conservancy of the Royal Rivers in the Country. This is here mention'd, because 'tis conceiv'd, that a New Oath cannot be imposed but by Authority of Parliament.*

*I suppose the Lord Mayor's Deputy Water-Bailiff was never upon his Oath not to connive at Encroachments on the River: But the very common Fame about the Water-Bailiff's Tenants, may make either a promissory Oath to that effect necessary in the beginning of every Mayor's Year, or at the end of it an assertory one that he hath not done it.*

*I know a Gentleman, who charging a late Water-Bailiff with taking of Money from Encroachers, was answer'd, That he did no such thing, but would not deny but that some of his followers might do so. Good God! what unsafe anchoring do all our great Trusts in this World find, while we trust our Bodies to Apothecaries Boyes, our Estates to Lawyers Clerks or the Apprentices of Scriveners, our Souls to poor Curates,*

rates, and our principal Royal River to  
a Water-bailly's Followers!

When I consider that mighty spirit of  
Industry that appear'd in France with  
success, for joyning the two Seas, a  
work that heretofore abash'd the Roman  
Empire, and was attempted and given  
over in foregoing Reigns, and yet not-  
withstanding the remoteness of the two  
Seas, the Mountains, the Boggy-Lands,  
the scarcity of Water in a Countrey  
where there was hardly enough to sup-  
ply the Gardens, and many other diffi-  
culties, that it was in a few Years  
brought to its perfection, while the  
Crown there was in War against the  
most powerful States of Europe united  
together, I shall wonder much if we  
have not a stock of Brains and In-  
dustry enough going to keep our River  
of Thames.

What great Pains and Charge the  
work of meliorating that River cost  
our Ancestors, the Chronicles tell us,  
and how useful for the preservation of  
it the pains taken in a late Conjunction,  
(when the Cities Charter was in its  
low estate) by the former Commissioners  
f of

of the Admiralty, proved, is obvious; and therefore the Wisdom of our Ancestors in Complicating the Office of the Lord Admiral with the Lord Mayors in its Conservacy, was very profound; for the Admiral's Office being during pleasure, we are sure that whoever have that Office, are the actual Favourites of the Government; and by being so, they have with the better success signalized their diligence in the preserving that River.

It must here in Justice be acknowledged, that the late King James, while the Admiralty was in his Hands, was not by all the Cares and Business incumbent on the Crown, diverted from the Conservacy of the River. And if all the particulars of the vast pains taken by Mr. Pepys therein, while he was Secretary of the Admiralty, were enumerated, they would fill a much larger Volume than what I here send your Lordship. His concerning himself so much and so often in the behalf of Petitioning Seamen who conceiv'd themselves injured by the Agents of Patentees requiring Money of them for their Ships lying on the Shoar, and his Frank interceding with the King



as Admiral for them, and effecting their being speedily righted, and that without any Fee of Office expected or paid, are things fresh in the Memories of those who live by the Thames-side below Bridge.

And the truth is, to a Person so knowing in the Office of the Admiral, it must needs be known, that Seamen being more than other Subjects compell'd to serve the Crown in times of Peace and War, and at the Crowns own Rates both at home and abroad, are entituled to a more tender Protection from the Crown than other Subjects are: And that the Seamen being call'd to such Service by the Admiral's Warrant, will in the Case of any general pressure happening to them wherein the King's Name is used, expect that the Admiral shall apply to the Crown in their behalf, as knowing that no Admiral ever refused or delay'd in such Case to take the trouble of patronizing them.

My Lord, I have now almost done troubling you for the present; and yet according to a Jewish Proverb, that Mo-

lestus ubi se molestum agnoscit, non est molestus, shall hope I have not done it at all. But I shall chiefly fortifie my hopes of my not having so done, by the Consideration of its being no trouble to you, but an Obligation for any One to furnish your great thoughts with any useful Materials for the promoting the service of your Prince and Countrey, in such a critical season as this, that calls so loud for that Old heathenish Virtue of the Pietas in Patriam to awaken it self among English Christians.

We may well believe our Chronicles, that tell us of a Porter who slept fourteen dayes and nights together, when we have seen so great a part of a whole Nation asleep four or five Years, and much longer.

The last Reign save one was a time wherein men made pleasure their business, and when the Nation suffer'd more by Lethargy than the Plague. But as Nature doth now call upon us to make Business our Pleasure, and to build Work-houses as well as Play-houses, so it may be supposed that our World is as weary of sleeping as ever it was of waking, and that Reasons for Mens being

being publick spirited and nobly active in all the publick Spheres in Magistracy to which they are call'd, may be patiently heard, and that it may seem a reasonable Request, since we see in things natural, some inanimate things to serve the Nature of the Universe do sometimes forgo and quit their particular Nature ( and as for example, water to prevent a Vacuum which Nature abhorrs, doth ascend, ) that Magistrates would go on in their own natural Course to what lyes in the plain way of their Duty, and what is incumbent on them by moral Obligations. Faxit : And that he may neither be a shame to, nor ashamed of his Countrey, who hath the Honour of being

My LORD,

Your Lordships most Humble

and most Devoted Servant,

T.H.

THE

## E R R A T A

In the foregoing Letter to the Earl  
of Marlborough.

**P**Age 2. for *Эвенха!* read *Эвенха*. p. 14. for *Britannij* r. *Britanni*. ib. for *Robora* r. *Robore*. p. 18. l. 3. after the word *Corporation* close the Parenthesis. p. 26. for *Moral* r. *Morals*. p. 46. for *raris* r. *Ranis*. p. 54. for Mr. *Joseph Coting* r. Mr. *Joseph Colinge*. p. 59. for *Hydraulica* r. *hydraulica*. p. 77. l. penult. instead of a Point of Interrogation make a Comma. p. 87. for the Year 1670. r. 1630. p. 97. for *patriotly* r. *particular*. p. 98. for *Thorna* r. *Thoma*. p. 105. l. 18. for *Subconservators* r. *Subconservator*. p. 110. l. 3. for *making* r. *speaking*. p. 110. l. ult. for *are* r. *is*. p. 114. l. 13. dele *perhaps*.

THE  
New Invention  
OF  
MILL'D-LEAD,

FOR

*Sheathing of Ships against the  
Worm, better for Sailing, and  
Cheaper above Cent. per Cent.  
than the old way with Boards.*

As also For

Bread-rooms, Scuppers, Furnaces, &c.

*The Objections, Answers, Proofs and Proceedings,  
between the Officers of the Navy and the  
Mill'd-Lead Company, before the late Lords of  
the Admiralty and Council-Board, submitted  
to Consideration.*

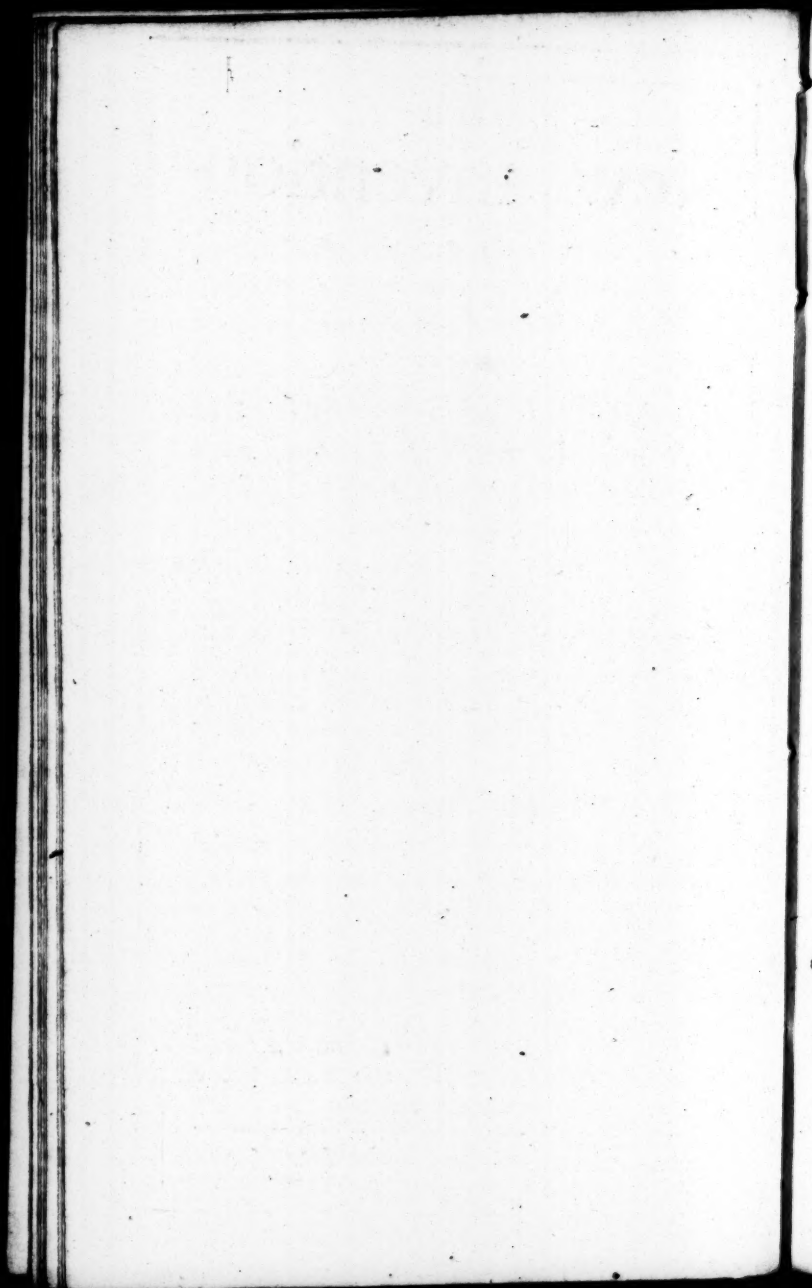
ALSO

The said Mill'd-Lead from many Years Experience, as well as the reason of the thing it self, proved to be much better and cheaper, for Covering of Houses, Gutters, Pipes, Furnaces for Dyers, Copperas-works, Lining of Cisterns, and other Vessels for Brewers, Dairies, and all purposes whatsoever, where Sheet-Lead is used, than Cast-Lead can be, and the Plumbers suggestions decrying the same, proved to be idle, scandalous and false.

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LONDON, Printed in the Year 1691.

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A  
TABLE  
OF

The Principal Matters  
in the following Dis-  
course of the New In-  
vention of MILL'D-  
LEAD.

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is this of Lead sheathing;  
against which none of the  
Evils in the former two,  
nor any other are at this  
day so much as suggest-  
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Navy themselves, after  
near twelve Tears ex-  
perience*

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*An*

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*A*

## A TABLE.

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*written by the ingenious Sir William Petty,*  
p. 117.

*A Survey of the Buildings and Encroachments on the River of Thames, on both sides, from London-Bridge Eastwards, to the lower end of Lyme-house, taken by the principal Officers and Commissioners of his Majesty's Navy, with the assistance of the Elder Brethren of Trinity-House, in pursuance of an Order of the Lords Commissioners for executing the Office of Lord High Admiral of England, Dated the first of March, 168<sup>3</sup>. Wherein is also particularly expressed which of the said Buildings and Encroachments are old, and which are new, and likewise which of them are judged  
most*

## A TABLE.

*most prejudicial to Navigation  
and the River, together with Re-  
ferences to each of them by Num-  
bers in the Draught of the River  
lately made by Captain Collins.*

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To the Right Honourable,  
 The  
 LORDS COMMISSONERS  
 For executing the Office of  
 Lord High Admiral of *England*.

*The humble Reply of Sir Philip Howard, Sir Francis Watſon, K<sup>t</sup>. and Comp. interested in the Manufacture and Invention of Milled-Lead, to the late Report to your Lordships from the Officers of the Navy, touching the Method of Lead-sheathing, used upon his Majesties Ships: Wherein they shew to your Lordships,*

Octob. 28.  
1682.

**T**Hat from every Ship of his Majesties that has been so sheathed, they have had complaints of the extraordinary *Eating* and *Corroding* of their *Rudder-Irons* and *Bolts*, beyond whatever was found upon any Ship not so sheathed, and annexed a Transcript of several Complaints by them received from several Commanders and others to that effect: And that therefore upon due

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sideration had thereof, and of the many Experiences had of the great damages arising from this sort of Sheathing; They give it as their Opinion, that it will not be for his Majesties Service, that the same be longer used upon his Ships: but that the Ships so Sheathed, may have their sheathing stripped off, and new Iron-work supplied where defective, as well to prevent any further damage from the longer Continuance of the said Sheathing upon them, as that they may be in a condition of service whenever on a sudden occasion, the same may be called for.

*To which Report, and the Matters of Complaint wheron the same is grounded, importing a vehement suggestion of ruine likely to attend the Ships and Service of his Majesty, in Case this Method of Lead-sheathing should be continued: The said Sir Ph. Howard and Comp<sup>a</sup>. do make this plain Return, viz.*

**T**Hat as their first interesting themselves in this undertaking, was wholly founded upon the hopes they had of being enabled to contribute somewhat thereby to the Service of the Royal Navy, and those hopes confirmed by as ample Instances of Publick approbation as were ever given to any precedent Invention; so do they still give his Majesties Service

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Service the same entire preference to all considerations of private advantage that either has or can arise to them from the same undertaking; And therefore are not only contented, but desirous, that in case your Lordships shall (after perusal of this Paper) hold the reasonableness of the said Officers Advice, for suppressing the further use of Lead-Sheathing, sufficiently demonstrated by what they have offered as the grounds thereof in that collection of Complaints: No Considerations relating to the Interest or Right of this Company, may stand in the way of whatever his Majesty and your Lordships shall think most for his Service to determine concerning it.

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*A Deduction of the whole Matter relating to the Lead-sheathing of his Majesty's Ships, with what this Company do in their Duty hold themselves bound on this Occasion to offer of their own Reflections and Sentiments thereon.*

IT was in the Year 1670. when this Company becoming Masters of this Invention of Milled-Lead, they soon met with Encouragement, not only from sundry Officers and Builders of the Navy, but from his Majesty himself, and his Royal Highness then Lord High Admiral of England, to an immediate exposing the same to practice.

But such was their backwardness to presume upon falling into the exercise of an Invention, ( though never so self-convinced of its Efficacy and Safety ) whose first Experiments, and future use, were principally to be made upon a Subject of so high consideration, as that of the Royal Navy of *England*, without passing the most strict and solemn probation a matter of that kind could, and ought to have in a Government like this subsisting by *Navigation*, namely, That of his Majesty's in *Parliament*, that they in the same Year brought this their *Invention* into the Parliament then sitting: Where, after all the severities of Scrutiny capable of being exercised in each of the *Houses* successively, and publick Conferences had with all Persons qualified for giving Advice therein, and those attended not only with the prejudice all new Propositions ordinarily meet with, but from opposition of the Persons interested in the preservation of the old ones, (whereof more hereafter,) it not only received full Approbation by being passed then into an *Act*, but had the same done in Terms the most expressive of the Conviction and Satisfaction wherewith his Majesty and *Parliament* passed the said Act with regard both to the *Invention* and *Inventors*; as by part thereof following appears, viz.

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An Act for granting unto Sir *Philip Howard*, Knight, and *Francis Watson* Esquire, the sole use of a Manufacture, Art, or Invention for the benefit of *Shipping*.

**W**hereas it appears upon Examination that Sir Philip Howard, Knight, and Francis Watson, Esquire, by their great Charge and Industry have found out a New Manufacture, Art, or Invention to preserve Ships, and other Vessels under Water, with certain Commodities chiefly of the growth of his Majesties Dominions, which is much cheaper, and more smooth, and durable than any way by Deals for Sheathing, or Pitch, Tarr, Rosin, Brimstone, or any Graving hitherto used; Now for the Encouragement of Ingenuity and Industry in the like cases; and to the intent that the said Sir Philip Howard, and Francis Watson, may be protected in the use of the said Manufacture, Art, or Invention, and have encouragement to make the same publick, for the benefit of his Majesties Dominions in general, &c.

This being done, and the said Company not only invited, but by his Majesty commanded to apply themselves forthwith to the putting in use this Invention upon some of his own Ships, they by his Order, and on Terms

adjusted with the Officers of the Navy, proceeded to the making the first Experiment thereof at *Portsmouth* upon the *Phoenix*, in the month of *March*, 1670, and not long after did the like upon several others, of which these following were part, *viz.*

<i>Dreadnought.</i>	<i>Forefight.</i>
<i>Henrietta.</i>	<i>Vulture.</i>
<i>Mary.</i>	<i>Rose.</i>
<i>Lyon.</i>	<i>Hunter.</i>
<i>Bristol.</i>	<i>Harwich. &amp;c.</i>

But your Lordships may be pleased here to be informed, That (however upon the stamp given it by Parliament) this Company were so let in by the Officers of the Navy to the exercise of their said Invention; yet was it not without fresh assaults from some who were interested in the benefit arising from the labour, and the Materials employed in the bringing on, and stripping off the *Wood-sheathing*, in whose place this was to succeed: And by their Arts and Industry, were Sir *Philip Howard*, and Company in a restless manner urged to give Answers (all over again) to the Objections formerly raised against them, and their Invention in Parliament, namely, *Its excess in charge above the ancient method, its rough lying on Ships sides to the prejudice of their Sailing. Its liableness to galling from the Cables, and cracking when brought on ground. Its tediousness in bringing on and off. Aptness to foul, and difficulty in cleansing. Lastly, Its undurableness*

undurableness and doubtful efficacy in what was chiefly expected from it against the Worm.

But so convincing were the *Solutions* brought (as before) to every particular, and the same so confirmed by a three years proof by this time made of the whole, and more especially by a Personal view had by the King himself of the *Phoenix*, then come in and Careened at *Sheerness*, in the Year 1673. after two Voyages to the *Streights*: That his Majesty to put an end to the unreasonable importunities till then continued upon himself and them on this Subject, was pleased by his then *Commissioners* of the *Admiralty*, to give a final Declaration of his Opinion and Pleasure concerning it, in an Order from those Lords to the *Officers* of the *Navy*, bearing date the 20th. of December 1673. as followeth, viz.

After our hearty commendations, in pursuance of His Majesties Pleasure signified to us by himself at this Board; that in regard of the many and good proofs which had been given of the usefulness of Sir Philip Howard, and Major Watson's Invention of Sheathing his Majesties Ships with Lead, in preference to the doing of it with the materials, and in the manner anciently used, (with respect had no less to the charge thereof, than the effectual securing the Hulls of his Majesties Ships against the Worm) his Majesties Ships may for the time to come be Sheathed in no other manner than that of Lead, without especial Order given for the same from this Board: These are to Authorize you to cause this his Ma-

*flies Pleasure herein to be duly complied with. And  
so we remain,*

*Your Loving Friends,*

Anglesey.

Ormond.

G. Carteret.

Notwithstanding which, such was the Reluctancy (or Caution) wherewith the Officers of the Navy did yet think fit to proceed in the adventuring to give any Encouragement to this Invention, That not adjudging a three Years proof available in this Case, they thought expedient to take two Years more, and the benefit of what Observations they could either make or collect from the several *Lead-sheathed* Ships employed on Southern Service within that time, the better to enable themselves without mistake to determine concerning the execution of his Majesties said Order; which indeed (after the five Years end) they did comply with, by entering into a solemn Contract with Sir *Philip Howard*, and *Company*, for the future sheathing his Majesties Ships with Lead, and this with such alacrity and fulness of seeming Conviction concerning it's advantageousness to the King, that (besides their voluntary exchanging *many and good proofs*, &c. the terms of his Majesties said Order, into sufficient proof and Experience of the Goodness and Usefulness of the Invention of Milled-Lead, and Nails for the Sheathing and preserving Ships against

against the Worm) they would not permit the said Company to reserve to themselves any part, but would secure to the King in the said Contract a Title to the whole term then remaining of the time for which they were by the *Act of Parliament* invested in the sole benefit of their Invention, and whereof there was then twenty years yet to come. And thus stood this Matter at the close of the Year 1675. when it might reasonably have been thought, that it had come to such, and so deliberate a settlement, as no new scruples could have been raised about it, on the part of the Navy Officers, or any occasion of fresh disquiet created to this Company.

But so it was ordered, or at least fell out, that no sooner were all things thus seemingly satisfied, and established at home, but a new Cry, and of a quite new kind, breaks out from abroad, of a quality discovered in our Lead-sheathing, tending (if not timely prevented) to the utter Destruction of his Majesties Ships, namely, That of the *Eating* into, and wasting their *Rudder-Irons* and *Bolts* under water, to such a degree, and in so short a space of time, as had never been observed upon any unsheathed or Wood-sheathed Ships.

Nor lay this long unseconded by concurrent Advices from *Portsmouth*, in reference to some of them that were sheathed with Lead, and then in that Harbour, and the Accompts thereof circumstanced with such particularities as seemed to obtain Credit not only with the Navy Officers, but his Majesty, and the Lords of the Admiralty, and even this Company too,



at least so far, as to excite in all a desire of Enquiry into the true grounds of it.

In order to which (leaving it to the Navy Officers to give your Lordships an Accompt of theirs, as we shall (by and by) of our own Endeavours therein) it pleased his Majesty, and my Lords of the Admiralty, not only by several Orders to recommend to the said Officers the general matter of this Enquiry, but (upon a suggestion made to them by this Company, of their apprehending this evil to arise from some *defectiveness* in the Iron-work it self, with a tender of their service, towards finding out the full truth thereof) to direct the Officers of the Navy by no less than four several *Orders* within the Months of *April* and *May*, 1678. to receive from the said Company what *Rudder-Irons* should be so provided by them, and employ no other upon any Ships to be thenceforward *sheathed* with *Lead*, than what were so provided, since which (being full four Years and an half) this Company has nevertheless been so far from having any opportunities given them by the said Officers of doing his Majesty the service by these Orders expected, That the first and only sight or knowledge we had of what progress they in all that time made towards the decision of this matter, is what your Lordships were pleased so lately to surprize us with in this their Report; wherein the whole supposed Consumption of the Iron-work of his Majesties Ships, and all the ruinous Consequences apprehended therefrom to the Navy, are expressly laid on Lead-sheathing, and that only; and grounded this their sentence upon  
no



no other Indutements (for ought appears) than the particulars of Complaint accompanying the said Report : The Truth, Consistences, and Conclufiveness of which Complaints for proving the chargeableness of this evil on Lead-sheathing, your Lordships will (we doubt not) see through, upon a bare review of the said Complaints, joyned with this their Reasoning therefrom, as follows.

1. From Sir *John Norbrough's* saying, That in *July* 1678, the *Plymouth's* Rudder-Irons began to be much eaten, doubting his being forced thereby to send her home that Winter, from the incapacity he was in, of getting her recruited abroad, and Sir *R. B's* adding in *September* 1682. that had she not been supplied with new Rudder-Irons before her coming out of the *Streights*, she had been in the same ill condition with another Ship he had then newly spoken of; whereas we are under no doubts of Sir *J. Narbrough's* owing to your Lordships what he has lately done to some of us, that she had no supply of fresh Rudder-Irons abroad, but came home with her old ones, and those (it seems) in so good case, that Sir *R. B.* could not distinguish them from Irons of a new supply.

2. From Sir *R. B's* description of the ill condition of the *Harmich's* Iron-works discovered at her cleaning in 1682. in their being eaten away to nothing, so as to make it matter of wonder that she sunk not in the Sea ; whereas (besides her said Iron-works having been fast-  
ened

ened in her five Years and an half, without any Complaint heard of concerning them all her Voyage, or at her coming home in *July*, 1679. Sir R. B. must be thought subject to some mistake; or both he, and the Surveyor of the Navy made accountable for a breach (much less easily answered for) both of the general Laws of the said Navy, and their particular Instruction therein, by suffering a Ship of her Value, and coming home in so sinking a condition, to lye afterwards above three Years in Harbour unsearched.

3. From Sir *John Kemphornes* Complaint in *June* 1677. of the *Dreadnough's* Rudder-Irons being within a Year and an half (and that in Harbour) so eaten, as not to be fit for her being adventured to Sea again with them, for more than a small tripp; and that followed by a later, from Sir R. B. in *October* 1682. wherein (after her having been abroad) he makes the Condition of her Iron-works so miserable, as to be under the same wonder he was before, that she also had not sunk at Sea; whereas it appears even from their own calculations, that her first set of Rudder-Irons lasted her four Years and an half, (which were it a common standand for their duration, and then to be renewed, would yet leave *Lead-beathing* greatly cheaper than that of *Wood*;) and her second (for ought that appears of any supplies) six Years and three quarters.

4. From a *Certificate* of the Officers in *Portsmouth-Yard*, in *October* 1677. declaring the Condition

dition of the *Lyon's Iron-works* under water, to be such as they never saw in any Ship they ever had to do with, not *sheathed* with *Lead*, though droven twice as long: Whereas that *Certificate* it self does not only expressly confess her *Bolts* having been all in her five Years; but will here furnish your Lordships with one Instance (besides the many you may hereafter meet with) of what this Company is owing for, to the sincerity as well as Thoughtfulness of its Accusers, if your Lordships shall please to have their last Assertion examined by the Books of the Navy Officers, with whom it carries so much weight, this Company being well assured, that instead of no Ship, not sheathed with Lead, being ever found perished in their Iron-work under water in twice five years, variety of instances will be met with, within much a shorter time.

3. From Sir *John Narbrough's* saying in *February* 1676. that he had found the condition of the *Henrietta's* Iron-works no other than that of the forementioned *Harwich*: whereas your Lordships may be pleased (here) to take notice, that the Lords your Predecessors in the *Admiralty* did by their Order of the 9th of *April* 1678. (upon some Complaints touching the Iron-works of this Ship,) recommend to the Officers of the Navy, the making a strict enquiry into the general and natural Reasons of this great Evil, directing them twice in the same order to the particular case of this Ship: For execution whereof the said Officers contented themselves, with answering the Lords  
not

not with any effects of their own Inquisitions, but with a bare Transcript only of Sir R. B's Conceptions thereon from *Chatham*; when (had they so thought good) they could as well have given their Lorships something of their own, by communicating to them the Result of an *Occular Survey* by them had in their Publick Office (this Company being present) of the Rudder-Irons themselves, sent from *Chatham* for that purpose; where (upon the outward coat of the said Irons being eaten off with Rust) the inside of their *Pintells*, (as never having had their *due welding*) discovered themselves in three several arms or branches, like the stalks of so many Tobacco-pipes, not only to the removing the wonder of this Ships condition, but confirming the suggestion this Company had before made to his Majesty and the Lords touching the *Smiths neglects*, and contributing not a little towards the making a right Judgment in the Matters in question, of which more in its due place.

6. From Sir R. B's observing in *September 1682.* the eating off of two of the lower *Pintells* and *Gudgeons* wholly,\* and a third in part of the *Rose*, which will not (as this Company conceives) be thought very extraordinary when it shall be understood that this is the first and only Complaint heard of her, not only after two Voyages to Sea, and one of them three years long, and her having lain now three years more in Salt water in Harbour; but after her having worn those Irons eight years, and the Complaint it self (when all is done)

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amounting only to three Pintells and Gudgeons, without any thing objected to the rest of her Iron-works.

7. From Sir *John Narbrough's* Information in *July 1678.* touching some defectiveness then discovered in the *James* and *Charles Gallies*, which he fears would force him to send them home that Winter, as not being repairable in the *Streights* : Whereas the *James* being sheathed, and sent forth in *October 1676.* continued there three years, when making a Tripp for *England*, she within two months after returned thither, and has there remained to this day (being in all six years) without ought said by the *Officers* of the *Navy*, of her having any *Recruits* of her *Rudder-Irons* in all that time either at home or abroad.

And for the *Charles*, which accompanied the *James* to Sea in *October 1676,* (instead of being driven home, as Sir *John Narbrough* apprehended in 1678.) she continued there till about *August 1680.* (being four years) and has now remained at home above two years more; (in all six years) without any such repairs alledged to have been given her either in the *Streights* or here.

8. Lastly, From these particulars of eight Ships, thus circumstanced, the *Officers* of the *Navy* have held it reasonable to assert to your Lordships their having received Complaints of the extraordinary Corrosion of the Iron-works of every of his Majesties Ships sheathed with Lead : Whereas these make but eight of twenty

ty so sheathed, without any thing either offered now, or heretofore appearing to this Company in exception to the other twelve, viz.

*Mary, Hampshire, Kingsfisher,  
Defiance, Foresight, Hunter,  
Woolwich, Phœnix, Vulture,  
Bristol, Assistance, Norwich.*

but on the contrary many Instances might be drawn from them, in advantage to the Credit of Lead-sheathing, of much more force ( were that the business of this Paper ) than any thing of what has been before offered to its diminution :

But this Company humbly refers your Lordships for that to the Navy Officers, contenting themselves with an Appeal only to the *Phœnix*, and *Norwich*, the first and last of all the twenty : The former of which coming home after two Voyages, and three years spent therein, happened (as has been already mentioned) to *Carreene* at *Sheerness*, where his Majesty receiving full satisfaction in her having answered all that was aimed at in this sheathing, she from thence proceeded to *Guiny*, and after return in 1674. was sent to *Jamaica*, (Voyages all calculated for the proving her against the Worm,) and coming back, was in 1677. stripp'd of her sheathing, and then sent abroad unsheathed, without having one  
*Bolt*

*Bolt* under water shifted from her being so sheathed to that day, being seven years.

And for the *Norwich*, we are well informed, that not one word of Advice, much less of Complaint has ever been received either from her Commanders, or any other hand, of the least defect discovered in any of her Iron-work under water during the whole four years time of her service in the *West-Indies*, from her first sheathing to the day of her Miscarriage.

*This is a Mistake, for she was neglected to be sheathed with Lead, tho' Order'd.*

Nor does this Company (after having thus opened the matters of Fact reported in these Complaints) conceive it will appear to your Lordships less allowable for them in this place, to make one Remark upon what the Officers of the Navy have offered in the same Paper of suggestions Philosophical, in support of their present Sentence against Lead-sheathing, which is, that they were suggestions, which seem rather calculated for the giving countenance to an Opinion already espoused, than for the raising an Opinion upon that, is yet in seeking; One being that of Sir *John Kempthornes*, who with some of his Officers lighting upon a piece of *Mixed-Lead*, (which seemed to them to have taken some wet) they conceived it presently to look of a *Cancarous* and *Corroding* substance, and venomous to Iron, (qualities not usually judged of by the Eye) promising the sending up a Sample of it to the Officers of the Navy for their Inspection; which if they did, the said Officers would not have needed any other Evidence against Lead-sheathing, than their Experiments upon this one piece;

had



had Sir *John Kempthornes* conceptions of it, met with any Confirmation therefrom; wherein your Lordships will easily receive full satisfaction from the said Officers.

Another, That of Sir R. B's, who in his Declaration upon this matter chargeth this Eating of the Lead—to the mixture it is prepared with for the making it run thin, by which it is rendred of a more blew colour than Lead ordinarily is, and with Salt-water creates a kind of Coperas that consumes the Iron-works under water; whereas whoever is conversant in the method of this Company in the manufacturing part of their *Invention*, know that the only mystery thereof lies in the application of Lead to Rollers, by which it is reduced without any inequalities to what degree of thickness or thinness is demanded, without the least other Preparation or Mixture exercised upon the Metal it self, but is pressed, and brought upon the Ships sides as simple, and unaltered as ever it flowed from the Pig.

The last, that of Sir *John Narbrough's* Opinion of its being the Copper covering the Rudder-Irons, and the Copper nailes the sheathing is fastened with, that destroys the Iron-work: where-to we hold it unnecessary here to return any thing in opposition more, than what the said Officers at the same time present you with of a quite contrary Principle, though in maintenance of the same Position, from Sir R. B. who expressly declares his having found by experience, That it is not the Irons covered with Copper, and nailed even with Iron Nails, that suffer from the Rust; but only those which  
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the Lead together with the Salt water drains and falls upon.

And this, My Lords, having been said in Reference to all that the Navy Officers have in their Report thought fit to give for the grounds of this their so positive Determination against *Lead-sheathing* : And wherein this Company have only this to ask, that they may not from ought they have already, or may yet further lay upon this occasion, be misunderstood by your Lordships, as if they were under any disbelief themselves, or aimed at the getting any in others, touching the Truth of Fact now discoursed upon, there being none more sensible than themselves, both of the Reality of this wast of Iron-work by *Rust*, and the ill importance of it, in its consequences ; They now proceed to the giving your Lordships the best assistance they can towards the discovery of what is the true source of this Evil, and that in the plainness of this following Method, *viz.*

1. By submitting to your Lordships their Opinion, and its Reasons, That the Sheathing of Ships with Lead, neither is, nor can (as such) be the true Cause of this decay of *Iron-work*.
2. By doing the like in reference to the Evils (for they are more than one) where-to this matter under enquiry ought right-fully to be imputed.
3. By

3. By conducting your Lordships to that, which they take to be the only, certain, speedy, and effectual *Expedient* of arriving at the *Truth* in this matter.

I. For the *First*, Against the charging this Mischief upon sheathing with *Lead*, be pleased to receive the Measures of this Companies judging therein, in the following Considerations.

(1.) That without taking upon us to Discourse as Philosophers of the different Structures, Consistences, Sweetnesses and Acidities of *Bodies*, and other Difficulties wherewith they have been frequently entertained, in their Enquiries on this Subject, They have made it their Endeavours to gather the best Information they can, by resorting to that purpose, to Persons of most allowed Name in Natural *Philosophy* and *Chymistry*, without being able hitherto to meet with one that will admit any thing to lye within the whole nature of *Lead*, that either singly, or from any alteration that can be begotten by its meeting with *Salt-water*, can contribute ought to the decay of *Iron* by *Corrosion*, as being a Mettal so void of any disposition that way, as to subdue that very quality of *corroding* in other Bodies the most acid and sour, of which, as we have had the honour more than once of hearing his Majesty himself discourse in Confirmation, so do we readily and humbly referr your Lordships not only to the same Royal Advice, but to the honourable and learned Gentleman, and most eminently so, for his researches into those abuses

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that; transfer parts of *Natural Knowledge*, Mr. *Boyle*,  
ertain; or whoever you shall please to consult with  
arri- herein, taking with you the like consideration  
Mil- about the *Nails*, to which some (as has been  
ed to already shewn) seem more inclinable to im-  
dging pute this Evil, than to the Lead, our daily  
experience shewing them at seven years end,  
as free from *Rust*, as at their first driving, and  
being so *Rust-proof* in themselves, will not any  
more be admitted with those we have dis-  
coursed with, as capable of infecting with *Rust*  
any other adjacent, or even contiguous Metal.

(2.) That from beyond the Memory of Man,  
and therefore before the being of this Invention,  
(at least within these Dominions) universal  
Practice both in his Majesties Yards, and  
Merchants Buildings, has and does at this day  
make *Lead* the common security of *Iron-work*  
against *Rust*, not only by covering therewith  
(upon all Ships unsheathed, and designed on  
long Voyages) the *Iron-work* about the *Rudder*,  
but by capping the heads of their *Bolts* under  
water with pieces of *Lead* sized to, and nailed  
over the said Bolts.

Nor is this all, for at this day whatever *Mer-*  
*chant-Man*, or *Man of War* is appointed for a  
Voyage where the *Worm* eats, the back of her  
*Stern-post*, and *Beard* of her *Rudder*, are sheath-  
ed with *Copper* or *Lead*, and this even where  
the Ships also are sheathed with *Wood*, the  
*East-India* Company it self, (upon whom we  
may best depend for cautions, wherever pre-  
servation of Ships is in question) not omitting in  
that very case, to sheath their *Rudders* with *Lead*  
or *Copper*.

Which

Which Practice could certainly never have prevailed with our Fathers, and been followed with so continued a consent to this Day by us, if the vicinity of either of these Metals assisted ( as is by some imagined ) by Salt-water, had been ever found of so pernicious and certain Effect upon the very Matter they are employed to secure.

(3.) Nor does what is thus approved of in the general, and universal Practice of *England*, want its confirmation, by the like of several Forreign Nations, to wit, the *Dutch*, *Portuguese* and *Spaniard* ; the first of which are equally observant with us, in the *sheathing* their *Rudder Irons*, and the *Back* of their *Posts* with *Lead* or *Copper* upon all Ships bound in the way of the *Worm* ; and for the two latter, not only the *Rudders* but the whole *Bodies* of their Ships under Water, even of their *Gallions* themselves, have of long time been, and are well known at this Day to be entirely *sheathed with Lead* ; which concurrence of these two latter Nations, seems in this Cause so much more considerable than that of any other, by how much not only their Voyages are the longest, their hazards therein from the *Worm* the greatest, and *Cargoes* the most valuable of all that Navigation knows, but for that the *Hulls* of their Ships abound the most with *Iron-work*, as having all that in the fastening of our Plank we perform with *wooden Trunnels*, done by them with large *spikes* of *Iron*.

(4.) Lastly, Were this Spoil of *Iron-work* chargeable

chargeable with nothing but what is contained in the *Lead and Nails*, these pretended Effects of theirs would be *constant and uniform* in all Ships alike sheathed; whereas nothing is more frequent than the Instances of their *Inequality*, as will enough appear from a bare Observation of what lies before your Lordships in this very Report of the *Navy-Officers*: Forasmuch as this *Company* dare put the whole Credit of their Cause upon that one *Issue*, viz. of your Lordships ever finding an *Equal Consumption of Iron-work* under Water, whether upon the same, or different Ships at any one time, or equal distances of time; the Account now before you of the twenty Ships that have passed this Method of Sheathing, affording a most ample Proof of this *Inequality*, by having eight of them loaden with Complaints, (and every one of them different from the rest, and at different times from it self) while we are yet to be told, whether the other twelve were not, (as we are sure some of them were) free from all ground of Complaint.

To our *Second Undertaking*, we conceive the *real Causes* of this *Evil*, (that is to say, so much thereof as is Extraordinary) to be these three.

1. The *perfunctory Performance* of the *Smiths* Part in this Affair, by some Deficiency either in the choice, mixture or temper of his *Metal*, or failure to give it its due *welding* or *working*: Forasmuch as by this alone can be reconciled the forementioned *Disparities* in the *Dura-*

Duration of *Iron-work*; whence otherwise can it be, that all other circumstances ( whereto that Disparity can be referred ) being the same, but the matter, one particular Piece of Iron shall remain undiminished three times as long as that next to it; and this not only in sheathed Ships ( as in the Case of those before you ) but unsheathed too; as ( to give but one Instance, in a Cause where every Ship is another ) appears in the *Swifures* first Voyage to the *Streights* with Sir *Rich. Rooth*, where two of her *Rudder-Irons* were eaten entirely in pieces, and shifted at her return in *Portsmouth-Dock*; while at the same time the rest ( though all put on together several Years before ) were found as firm and unwasted as at their first fastening.

The consideration and thorough conviction of which led this *Company* in the Year 1678. ( when these Complaints were most active, and the Lords of the *Admiralty's* Inquisitions into the Reasons of it, the more pressing ) not only to Communicate to them, and the Navy-Officers their Opinions therein, but at their own hazards and the Ordinary Price, to become Undertakers themselves for what further *Rudder-Irons* should be from thence called for ( whether at home or abroad ) by any Lead-sheathed Ships: Which Proposition was not only approved of, but the Officers of the Navy ( as has been already said ) by Orders upon Orders from their Lordships directed, to see the same instantly put and continued in practice.

But whence it was that those Orders met with

with no better compliance, or how it came to pass, that so certain, speedy and chargeless an *Expedient* of coming by the *Truth* in a matter of this Importance (and after a provocation too, so publick and seasonable, as that of the *Henrietta's* Rudder-Irons above mentioned) could be so disregarded as never once to be set on *Trial*, your Lordships will be best informed from them themselves, by whom variety indeed of Ships were sent to Sea, subsequent to the said *Orders*, but without any call or notice given thereof to this *Company*, that his Majesty might have the proof and benefit of the Service so much expected from them, and required from the said Officers both by the King and Lords on this occasion. -

2. The manifest and knowing *Omission* of the Persons charged in seeing the said sheathing brought on, to do in this case what the practice of all times, and at this very day, both in the Kings and Merchants Service, has made a standing and necessary piece of care to be exercised in the fitting forth of all Ships (sheathed and unsheathed) bound on Forraign Voyages, namely, The *parcelling*, or laying with *Tarr* and *Hair* all the Iron-work under water, before the sheathing, (in case of the former) or the forementioned *Capps* (in case of the latter) be brought over them.

In which as we are ready to appeal to the *Surveyor* of the *Navy*, or whoever else is conversant in the Rules and Methods of *Ship-Building*, for the *Truth* of what is here asserted, and what is owned in some of the Navy Officers own Evidences, and particularly in a



Letter of Sir R. B's; so do we willingly referr our selves to the same *Surveyor* for the Truth of this suggestion of ours, touching the under Officers omitting the performance of this their known Duty of laying the Iron-work under water, at their bringing on the sheathing of the said Ships.

And if so, and that this Companies pretensions in this Method of sheathing never extended further, than to answering the efficacy, cheapness, and other circumstances of advantage appertaining to the prevention of the *Worm*, (as the *Act of Parliament*, and their Contract with the King abundantly prove) what more Reason is there for their being held accountable for the Consequences of this *Omission* in the Kings Officers, than for that of *starting* of a *But-head* in a Ships side, that never had its due fastening? It being no part of their Undertaking to answer for the *Tightness* of their sheathing when laid on, and drovert with Nails, further than for its *unpassableness*, not to the *Water*, but to the *Worm*: And that being allowed, what can be more *demonstrable*, than that the *neglect* of ordinary Cautions, must be attended with the ordinary Evils, those Cautions were provided against.

Of which, that this of giving the *Iron-work* of these *Lead-sheathed* Ships, their ordinary Defence against the *Salt-water* by *Parcelling*, or laying them with *Tarr* and *Hair* under their Sheathing, is one, we shall not need to confirm to your Lordships by more than the single Instance of the *Phoenix*, which having had her *Sheathing* performed by Sir *Ant. Dean* at *Portsmouth*,



mouth, with this *common* right done to her, appears not to have had one *Bolt* shifted within the whole seven Years of carrying the same: Nor are your Lordships without an eminent proof of your own, touching the constancy and universality of this practice of laying the *Iron-work* of all sheathed Ships with *Tarr*, and *Hair*, or *Parcelling*, and the acknowledged importance of it, for the securing the said Iron-works from the Salt-water, (which alone can perform upon that Metal, all that is here laid upon the Lead) in the *Happy Return*, sheathed but very few dayes since with *Wood* at *Woolwich*, where your Builder will be found in the ordinary course of his Trade to have laid with *Tarr* and *Hair* all her *Bolt-heads* under water, and fastened *Caps* of Lead over them, notwithstanding this Sheathing with *Wood* was to be brought on over all.

3. The unaccountable *continuance* of these Ships for nine, ten, and eleven years together in their *sheathing*, without their being in all that time *unstripp'd*, for the necessary *searching* of their *bottoms*, and timely supplying the *decays*, (whether in Iron-work, or otherwise,) which are of course to be expected within their proper distances of time; which as it contradicts all ancient practice both of the Royal Navy, and that of Merchants, especially in the case of Ships of value, and under careful Owners, so seems it in this of ours, to be designed only to render that very *Vertue* for which (amongst others) *Lead-sheathing* exceeds all that ever went before it, namely, its *durableness*, a Vice of much worse consequence

to the health of a Ship, than all it pretends to do, and does against the Worm, can make amends for.

Your Lordships might otherwise be pleased to inform your selves from the Officers of the Navy, whence it comes to pass, that after such Complaints received from abroad, as they have handed to your Lordships, touching the dreadful *decays* of those Ships Iron-work under water, they should suffer them, when come home, to *continue* for two, three, and four years together in *Harbour*, without any thing more done in all that time, towards their Relief against the *growing Mischiefs* they are yet daily exposed to, than a Declaration of *Wonder* at the three or four years end that they had not before sunk in the Sea.

Very dissonant is this Method of Proceeding (my Lords) from the Primitive and present Institution of the *Navy*, that provides so carefully both in its joynt and separate *Instructions* to the Officers thereof, and more particularly to the *Surveyor*, not only for the general good Government and Preservation of his Majesties Ships, but a more strict and *Annual* State to be had of all their respective Hulls, Masts, and Yards, in order to your Lordships taking such course for their Ransackings, Groundings, Dockings, and Repairings, as by you shall be thought most for his Majesty's Benefit.

Nor are those *Instructions* a little enforced upon the said Officers by that *standing Article* in the ordinary Estimate of the Navy, wherein they Annually make Demands of a par-

particular sum of Money towards their Execution thereof, nor were ever denied the Allowance of it by his Majesty, as Duties owned on each side necessary to be performed.

Which, how far it has been done in reference to those unhappy Ships, which of all others have the least reason to suffer under this neglect; for that by the terms upon which their Sheathing is performed by this Company for the benefit of the King, They are well able to bear the charge of their having it done twice within the Time, some of them (to the hazard of their Ruine) are suffered to remain under its being done but once. We humbly submit to your Lordships, and (with our full concurrence to that part of their Report, wherein they have at length bethought themselves of advising your Lordships to order the doing of that now, which the Practice of the Navy, and the acknowledged condition of those Ships would have expected their having done *long since*) proceed to the third and last branch of our Undertaking, and to that humbly say, *viz.*

3. That in order to our leading your Lordships the more satisfactorily to what we take to be the only True and Competent method of rightly determining of the different validities of what has been severally offered and asserted by the Officers of the Navy, and this Company, in Maintenance of their different Conceptions touching the Evil now enquired into: Your Lordships may in the first place be pleased to take notice, (and therein to have the Opinion of the said Officers) that no Ship

however sheathed or unsheathed, did ever make a Voyage to Sea, where her Iron-works came not home in a *greater* or *less* degree seized on, and impaired by *Rust*. Next, That this *Company* does voluntarily take upon it self (beyond what by any thing in their *Contract* they are obliged to) an accountableness for this their Method's being as secure on behalf of the King, in reference to this very point of the Iron-work, as Wood-sheathing, or any other hitherto known, can be shewn to have been.

Which being premised: And forasmuch as nothing is more *true* in *Fact*, or more legible in the Records of the *Navy*, than the constant charge the Crown has been always at for the shifting and supplying the *defects* of *Iron-works*, besides what is to be read in the heaps of decayed Bolts, Rudder-Irons, &c. rarely missing in his Majesty's Yards, but after a sale: And whereas it is no less manifest, that among the other Instances already spoken of, of the unequal decay of Iron-works, this is one, *viz.* That it has not been seldom noted to exceed in the same Ship while unsheathed, what it has at another time been, even while in a Lead-sheathing; witness the forenamed *Phoenix*, which being furnished with a new *Sett* of Rudder-Irons, at the stripping of that Sheathing in *Jan. 1677.* and soon after sent so stripp'd to the *Streights*, was forced in the very same Year, about *Christmas*, to shift every one of them, but one Brace, and much of her Bolts, and other Iron-works, while (as has been already noted) she appears not to have shifted so much

as one Bolt, or received any considerable Recruit of other Iron-work within the whole seven years of her being Sheathed with Lead, with which concurs the case of the *Forefight*, whose new sett of Rudder-Irons, put on in *Jan.* 1672. when unsheathed, were shifted in little more than a year and an half, viz. in *Aug.* 1674. when being Sheathed with Lead, she continued without any supply of Rudder-Irons till 1679 : Nor do we think it would conduce a little to the satisfaction of your Lordships, upon this very head to require a just account of what has been lately observed in the Ransacking even of a sheathed (that is to say a Wood-sheathed) Ship of his Majesty's, where under the protection of such sheathing, Ships Iron-work has been reckoned the best secured against Corrosion ; yet even in this case will your Lordships find upon the forenamed *Happy Return*, the greatest part of her Iron-work eaten to pieces, and particularly her Bolts from Stem to Stern.

This Company therefore being in no kind desirous that his Majesty should be under any Obligation, of serving himself with their Invention, longer than it shall appear as safe to his Service and Ships in this particular of Iron-work, as it has proved it self *Superiour* to that of *Wood* in every other circumstance, and they being to that purpose most willing to have the same determined by the *difference* that shall be found between the *Charge* his Majesty has been at for Iron-work for any number of years backward upon unsheathed, or Wood-sheathed Ships, and those sheathed with Lead, where

the work thereof in their sheathing and fitting forth has in other respects been performed, but with the same ordinary care, and observation of the common practice of the Navy.

They come now to offer to your Lordships that which (and which only) can give you a full, easie, and uncontrollable account of the *Truth* in this matter, namely, Your *Order* to the *Officers* of the *Navy*, for their directing a thorough and impartial *Inspection* to be made into the *Books* of the several *Yards*, with a particular Account drawn thereout, of what new Rudder-Irons, Bolts, &c. have been for ten or twelve years last past furnished to any of his Majesty's Ships, mentioning the Names of the said Ships, and distinct times of such their supplies, distinguishing also between such thereof as were *wholly*, and that were but in *part* supplied with *new Rudder-Irons*, and mentioning (in the latter case) how many, and which of the said Irons they were; with a Report of the result thereof to be made to your Lordships as soon as it shall be prepared, and mutually accorded to (for its *Truth*) between the said Officers, and this Company, who have nothing more now to add on this Subject, than the observing to your Lordships, that had it pleased the Officers of the Navy to have contributed their furtherance to the searching out the *Truth* in this *Cause*, with a zeal equal to what this Company have, to the best of their understandings ever endeavoured to express towards it, this work (no more than that relating to the *Smith's*) had been at  
this

this day to do, they having made the same overture to the Lords and them, touching this very Expedient of *examining* their *Books*, at the same time with the other in 1678. and prevailed at length with the said Officers to issue Orders to the several Yards suitable to this *Proposal*; but with what success, we humbly crave your Lordships to receive your satisfaction from *themselves*, whose producing the *Returns* thereof from the Yards, (if made) would at one view have helped your Lordships to what must be owned by the Officers of the Navy, for the only, secure, clear and effectual means of *determining* this *Controversie*, without either creating to your Lordships, or continuing upon themselves and us, the trouble attending this tedious method of Dispute.

But, *My Lords*, that while we speak of *tedious*, we may render what we are now doing, as little so to your Lordships, as the Matter put into our hands, and our Desires after his Majesty's and your Lordships Satisfaction will permit; we shall now betake our selves to the last *Article* of our purpose in this Paper, namely, the opening so to your Lordships a no less certain view of a *Cure*, than we hope to have now done of the true Means of right discovering the *Disease*: For, *My Lords*, however astonishing the *Gentlemen* of the *Navy* seem to make it, that Ships abandoned to all the above mentioned neglects, and even arts of ruine, should in length of Time arrive at such a state of weakness, as to be suspected in their being able to support themselves above water; We cannot but hold



it a Subject much more fit for *Wonder*, that they who under the Lord High *Admiral*, are by the Crown made the first and principal *Curators* of the Health and Safety of its Ships, should not only content themselves for several years together, in joyning with the Cry against an *Evil*, they describe in Terms so frightful, without making in all that time any one offer, or seeming step towards its Remedy, but publish to all the World a *neglect*, *contempt*, and *endeavour* of *Discouraging*, and even direct withstanding whatever was proposed to that purpose by any others, as may appear,

(1.) From their open patronizing every of the Objections and Difficulties that this *Invention* has from the beginning had to contend with, though so *groundless*, that not one of them is now thought fit to be remembered in this their Report to your Lordships Inquisition, after the Complaints made against it.

(2.) From the manifest Industry wherewith (when time was) they laboured to expose it, by an application of it upon the *Eagle*, and serving themselves at her return, with the success of their so doing, towards verifying their former declaiming against its sufficiencies, *viz.* The Condition it now came home in upon this Ship all cracked, and rent from Stem to Stern; whereas the *ingenuity* of their dealing with us in this particular, had the misfortune of being first discovered by the KING himself, upon a personal view he was pleased to take thereof, and his therein observing



ing the said Ships being by age become so decrepit, as to be brought home by her Company with her whole Body woulded about with *Hawfers* for preventing her very sides falling out, and Bottom dropping into the Sea.

(3.) From their violation of every of the *Orders* heretofore mentioned of his Majesty, and Lords of the *Admiralty* relating to this Affair, one forbidding (above nine years since) the use of any other method of Sheathing, than this of Lead, without *special Order*; whereas the contrary has been practised by them in many Instances. Another, for their sheathing *two Ships*, one with Lead, the other with wood, in express order to a Proof to be made (upon some difference in Opinion between themselves and one of their own number) touching the good quality of their *Rudder-Irons*: A *Third* for doing the like to the *Normich*, with Directions to imploy such Rudder-Irons thereon, as should be provided by this Company: And a *Fourth* (inculcated within few dayes by a *Fifth*) forbidding the whole use of any other Rudder-Irons upon Lead-sheathed Ships, than of this Company's furnishing: But with so little regard ever paid to the same, that rather than any Order, or even the most *Essential Rules* of the *Navy* should stand in the way of their prejudice to this *Invention*, they have taken upon themselves the sending into the mouth of the *Worm* no small number both of Men of War, and others of his Majesty's Ships naked in their Hulls, without any security against the worst effects thereof; which, what they have been, your Lordships will more properly be inform-

informed, in, upon their Return home and Ransacking from the Officers of the Navy, than from this Company; some of whose Experience nevertheless, and what present Advice they have received from abroad, will justify their saying thus much before hand, that those Effects will be found of many times *more Charge* to the King than all that the Complaint now before your Lordships concerning Rudder-Irons can be made to amount to.

But, (My Lords,) As these Proceedings have not heretofore, neither shall they now discourage this Company from a free Discharge of their Duty, by opening whatever Conceptions of theirs they think reasonably grounded towards the Remediying as well as Right understanding the *Original* of the *Evil* laboured under, and a Remedy both Obvious, Easie, Effectual, and next to being of no Charge, we take our selves to be Masters of, and shall lead your Lordships to the concurring with us in it, by the few steps, or Reflections following, *viz.*

*First*, That the only competent and allowed *Defence* of Ships against the *Worm*, before this of *Lead-sheathing*, was the paying the Hulls from the Waters edge downwards with *Stuff*, and laying the inside of a Sheathing-board (from inch and quarter to three quarters thick) all over with *Turr* and *Hair*, to be brought over the forementioned *Stuff*, and being well nailed, *Graving* or *Paying* the outside of the said Board all over with another Composition of Brimstone,

stone, Oyl; and other Ingredients, which is called *Wood-sheathing*.

Concerning which, however united the Opinion of *us English Men* may be thought to have been touching the same, it seems to this Company grounded not so much upon the real Perfection thereof, as the *Profit* that attends it to the *Builders* interested in the working of it, and consequently, leaving them under no temptation, either to look out for a *better* themselves, or give encouragement to any discoveries made towards it by others.

And that indeed the so universal Reception given to *Wood-sheathing*, is rather due to this, than its own real sufficiency, your Lordships will be Judges of, from the following Notes.

1. That if not the most, at least the most essential of all the *Ingredients* employed in that method of *Sheathing*, are of *Forreign growth*; which we make use of not so much for the sake of the Nationality of its Argument, (though yet that is such as the Parliaments of *England* have ever laid great weight upon in all their Deliberations upon Trade, and particularly in the *Act* relating to this very Invention,) but from a Consideration which the *Books* of the Navy sufficiently confirm the force of, *viz.* That being *Forraign*, such has sometimes been the *scarcity* thereof here, (even when their use has been most wanted,) that they have been either not to be had at all, or at Prizes much exceeding the ordinary Market.

2. That

2. That the said *Wood-sheathing* hath been always observed and confessed to be very apt to gather Filth, and of no less *uneasiness* when fouled to be thoroughly cleansed again.

3. That from its roughness and the multitude of Nail-heads standing out from the Ships sides or otherwise, Ships sheathed with *Wood* have ever been complained of, as lessened thereby in that only quality upon which our *Friggats* most value themselves, and have their Service in preference to others calculated from, namely, That of their *Sailing*; for proof of which, your Lordships have not only the Evidence lately mentioned of the Navy Officers, choosing to send *naked Ships* to the *Streights*, when with as little violence to practice and order, they might have sent them so sheathed; but that general application, which was heretofore made to his Royal *Higness*, then Lord High Admiral of *England*, by the Flag-Officers and Commanders of the Fleet, designed under Sir *Thomas Allen* (as we remember) against the *Turks*, advising, that as his Majesty would expect any success of the said *Fleet* against that People, he would let his Ships go with all their virtue of *Sailing* about them *undiminished* by *sheathing*, as being (from former Experience of the *Turks* out-doing us that way) taught, that without this, nothing was to be hoped for of Advantage to be gained upon them; which Advice of theirs was urged so pressingly, and justified so fully, that both his *Royal Highness*, and the then Officers of the Na-  
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vy concurred with those of the Fleet, (in the Council thereupon given his Majesty, and afterwards pursued) rather of exposing the *Hulls* of his Ships to the worst Effects of the *Worm*, than hazard the loss both of their whole Service, and his own Honour by *sheathing*, and thereby disabling them in this their best quality of *Sailing*.

*Secondly*, Which being so, and that therefore (besides these plain and important *Imperfections* in *Wood-sheathing*) the only Remedy hitherto thought on, has been to deliver up his Majesty's Ships to the mercy of the *Worm*, by sending them abroad wholly unprovided of any Fence against them: This Company takes leave in the next place humbly to recommend to your Lordships the *requiring* from the Officers of the Navy an impartial *Account* of the *condition* wherein the Ships of that Fleet of Sir *Thomas Allen's* brought home their *Hulls* notwithstanding all the mighty professions then made by their *Commanders* of the care that should be taken in the frequent turning up of their *Bottoms*, and use of the long *Scrubbing-brushes*, then first devised and introduced into the Navy for the easier reaching towards their *Keeles* in the making of them clean.

And for whatever issue your Lordships are to expect from the late Liberty taken by these Gentlemen of doing the like on other Ships at this day, though it be yet too soon for your Lordships to expect any certain Account thereof, as being a Matter not to be done before  
they

they are brought in and searched ; Yet we cannot think it will be reckoned any ill measure for your Lordships to frame your *Expectations* by therein, to consider the single case of the *Rupert* in her last Voyage to the *Streights*, under Captain *Herbert*, which Ship in lieu of being according to the Kings Order sheathed with *Lead*, was by the said Officers Advice, and the Undertaking of her Commander for the frequency of her cleaning, sent away *naked* (saying in her Keel, which was *Leaded*) with this success, that besides the Apprehensions Captain *Herbert* was under concerning her, even while in the *Streights*, upon what was then discovered relating to the *Worm*, putting him upon thoughts (had it been practicable) of shifting her *Garble-strake* there ; The Officers of the Navy are well able to inform your Lordships, that (notwithstanding all that promised care of Captain *Herbert*, and their own presumptions thereon) it will be no small charge to his Majesty to make good the damage she brought home by *Worm-eating*.

What then remains after this that has been said, and lies so easily within your Lordships *proving*, touching the *Imperfections* of both these Methods of *Sheathing* Ships with *Wood*, and exposing them to Sea without any Sheathing at all, but the waiting for some *Fourth*, not yet heard of, or continuing this *Third* under debate, of Sheathing with *Lead*, to which nothing is so much as pretended to, in Objection by the Officers of the Navy themselves, but this of its supposed Influence upon *Iron-work*, as very well knowing, that

that no room is left for the least such Pretence upon any one head of what has been ever suggested to the contrary, especially in those particular points of *Imperfections*; wherein that of *Wood-sheathing*, and sending of Ships abroad unheathed, appears (as before) to remain yet chargeable; *England* being never to be supposed unfurnished with *Lead*, as bearing it within its own Bowels; Nor any Complaint hitherto heard of, either of its being in any degree so apt to *foul*, or difficult to *clean* as *Wood*, Nor lastly, so much as one suggestion ever made of its injuring Ships in their quality of *Sailing*; but so much the contrary, that we are ready in all humility to make our Appeal to his Majesty himself, whether the *Harwich* sent in her *Lead-sheathing*, Anno 1677. under Captain *Killigrew* to the *Straits*, and hurried out from *Chatham* under the disadvantage of not being so much *Tallowed*, suffered any thing from her said *sheathing*, in her virtue of *Sailing*; or did not outgo all (both Ships and Yatches) that were then attending the King with her, in his passage to the Westward.

But of what satisfaction can this (say the Officers of the Navy) be, if one *Evil* superior to all those *Good* qualities (for so they understand this about the *Iron-work* to be) remains unremoved?

To which, (My Lords) we come now to Answer, and in so doing to open to your Lordships what this *Company* takes to be the most natural, easie, and thorough *Remedy* thereto, even though it were *possible* (as they believe, and doubt not upon proof of what is here said



said of your Lordships believing also, that it is not) that this suggestion of the *noxiousness* of Lead to Iron-work were true.

And this your Lordships may please to take from us in these few following considerations.

1. That after all the noise that has been made of the *damage* sustained by the King from this untimely consumption of his Ships *Rudder-Irons*; his full charge for a whole set of them for a Ship of each of those Rates upon which *Sheathing* is ordinarily used, *viz.* from a *Third Rate* downwards, will not one with another exceed the values following, *viz.*

Rate.	First cost.	Value of Returns.	Clear charge.
For a Ship of the	3 15 10 0.	5 13 0.	9 17 0
	4 9 18 0.	4 4 0.	5 14 0
	5 6 4 0.	2 10 0.	3 8 0
	6 4 10 0.	2 2 0.	2 8 0

2. That according to the *Report* of the Navy Officers themselves, with the *Schedule of Complaints* attending it, and what has been observed by us therein, it is evident that the *shortest Time* to be supposed for the ordinary duration of *Rudder-Irons* in *Lead-sheathed Ships*, is two years and an half, or three years, within which time no Ship of his Majesty's was ever known, or can be supposed to want an opportunity of *Grounding* or *Docking*.

3. That (besides the other great advantage of



of cheapness which *Lead-sheathing* must be owned to have above that of *Wood*) the *Prices* in this *Table* (were they of ten times the value) would not bring the charge of *Rudder-Irons* to any equality of consideration with the *Evils* lately recounted in both the other methods of *Sheathing* with *Wood*, or not *sheathing* at all.

4. And that therefore in the last place, forasmuch as universal consent and practice allows the laying them with *Tarr* and *Hair* under *Lead*, to be a certain security to *Ships Iron-works* under water against *Rust*, at least for so much as concerns their *Bolts*: And that therefore the only thing we seem now to be in care for, is the supplying the Consumption that may happen during the Voyage in their *Rudder-Irons*, which (were fresh ones in the way) no Ship (as is already shewn,) can at her *Grounding* or *Docking* want opportunities of doing by shifting them; what then (in one word) can be more demonstrable than that a spare Set thereof sent to Sea with every *Lead-sheathed Ship* (answerable to what is daily done in materials of much greater charge, and for uses of less consequence) is a no less easie than ready and *Effectual Remedy* to all the damage that can be apprehended incident to a Ship upon this head of *Rudder-Irons* in any Voyage not exceeding five or six years continuance.

Nor (may it please your Lordships) do we offer this as a new Resort whereto this Report of the Navy Officers may be thought to have driven us at this day; Forasmuch as it is no more than what in the same Terms this Company

*pany* proposed in the year 1678, to the then *Lords of the Admiralty*, and the Officers of the *Navy*, when upon the like considerations then urged, their Lordships were pleased not only to approve it, but by their express *Order* of the 12th of *April* in that year, to require the said Officers (amongst other things) to receive from this *Company* such *Rydder-Irons* as should be by them provided, upon a Proposition they had then made of furnishing his Majesty's *Lead-sheathed Ships* with that Commodity, not only for their present use at the time of their *Sheathing*, but for a *Reserve* to answer accidents during their *Voyages*.

Which *Order* (if executed) must have long agoe with little charge, and less trouble, put an end to this clamorous *Evil*, (wherever the cause of it should at length have been found to lye) and would (by preventing the great damages his Majesty is supposed to have sustained from it,) have furnished the said Officers with a much better Expedient of testifying their regards to the King, and his Service: Their Duty to your Lordships, and the Lords your Predecessors; Their heedfulness to the Established Methods of the *Navy*, and their own parts declared therein: And lastly, their good will to these the humble *Endeavours* and early *Proposals* of this *Company* for the Service of his Majesty on this occasion, than thus by their own *Failures*, first not to prevent these Damages, next to prolong them, and then to complain of them.

## COMPLAINTS.

*An Account of the Defects of his Majesties Ships which have been sheathed with Lead.*

Navy Office  
20. Dec.  
1682.

Sheathed 1671, Tallowed at *Portsmouth*, 6 June 1677, and the Pintels and Gudgeons of her Rudder-Irons (which were all new about a year and an half before, and the Ship not out of Harbour since) very much eaten and consumed, and not to be trusted at Sea, unless for a short tripp, and the *Swiftsures* that was graved at the same time, her Rudder-Irons firm and found, and not in the least consumed, though much longer on. See Sir *John Kempthorns* Letter, June 1677.

She was again haled on Shore to clean, 8 October, 1682, and her Bolts found totally eaten away, as well as the Spikes and Iron-works of the Rudder, so that they were forced to Plugg up the bolt-holes, and spile the Spike-holes, there being nothing left in them but dirt, and new Iron-work must be drove before she can go to Sea. See Sir *R<sup>B</sup>*'s Letter 8 Oct. 1682.

Dread-nought,

vide *Ans<sup>w</sup>*.  
pag. 12.

Obs. This Sheathing had continued on eleven Years.

Sheathed 1672. in October 1677. the greatest number of her Bolts under water (under the

Lyon,

v. *Answ.*  
pag. 13.

the Lead Sheathing ) found very much corroded and eaten, insomuch that some of them were gotten out by the Caulkers with their Spike-Irons. The Spikes and Nails also under water under the Lead-sheathing almost eaten to pieces, the like whereof the Officers at *Portsmouth* say, they never found in any Ship not sheathed with Lead, although their Iron-work had been drove twice as long. All her Bolts drove new about five years before. See the *Officers Certificate*, 6 *Octob.* 1677.

Rose,

v. *Answ.*  
pag. 14.  
Obl. This different decay cannot happen from the same Cause, viz. the Lead-sheathing.

Sheathed 1674. In haling her on shore to clean in 1682. the two lower Pintells and Gudgeons of the Rudder-Irons quite eaten off and the third almost off, so that the Rudder was found to be unhung. See Sir R. B's. Letter 21 *September*, 1682.

Harwich

v. *Answ.*  
pag. 11.

Sheathed 1675. upon the Careening abroad in *February* 1675. & 6. the Iron-work found much eaten with Rust about the Stern, especially the Rudder-Irons, imputed to the Copper Nails that fasten the Lead-sheathing. See Sir *John Narbrough's* Letter 20. of *February* 1676. When in the Dock, *Anno* 1677. her Rudder-Irons Stirrups, Staples, &c. found very much corroded and consumed, and rendred unserviceable, and the *Nonfuch's* Rudder-Irons, &c. (being at the same time in the Dock) very good and firm, although she had them on several years before the *Harwich*. See Sir *John Kemptborne's* Letter, *April* 1677. Upon her cleaning *September* 1682. all the heads of the Bolts found eaten away on both sides, and

and as well those as the Ragg-bolts eaten away to nothing, and so also the Rudder-Irons, so that she must have Bolts drove on both sides before she can go to Sea, and have new Rudder-Irons. See Sir R. B's Letter, 24 September 1682.

Sheathed in October 1676. her bottom was viewed in February 1677. in Livorne mould, and the Lead found all cracked in every Seam from one end to the other, as bad or worse than the *Eagle*, when she came from *Guinny*, and her Rudder-Irons eaten clear asunder, her Rudder-Irons were there mended, and in October following her Rudder new hung at *Tangier*, the Irons being all again eaten in pieces. See Sir *John Wyburns* Letter and Account: she was repaired at *Woolwich* in December 1679. and her Lead-sheathing stript off, the same being crackt in several places, and the Rudder-Irons being eaten by the Rust, were forced to be shifted. See Mr. *Shishes* Letter December 15. 1682.

James Gally.

But it seems not so as that any worm entered, against which Sheathing is only intended.

V. Ans. p. 15

Sheathed 1676. Sir *John Narbrough* in July 1678, writes, That the Rudder-Irons were defective, so that he must send her home the ensuing Winter. See his Letter July 30. 1678. Upon stripping off her Lead-sheathing, Anno 1680, her Rudder-Irons under water found so much decayed, that she was supplied with new ones, likewise all the Bolt-heads under water, in the but-ends of her Planks quite eaten off, and most part of the heads of the Ryder-bolts, and the Bolts in the Scarfs of her Keel and Stern. See Mr. *Shishes* Letter December 15. 1682.

Charles Galley,

V. Ans. pag. 15.

Sheathed

Plymouth. Sheathed 1677. Sir *Jos. Narbrough* being in her in *July*, 1680. writes, that her Rudder-Irons begun to be much eaten with rust, so that he believes he must be forced to send her home that Winter. See his Letter, *July* 30. 1680.

vid. *Answ.*  
pag. 11.

Fore-  
sight.

Sheathed 1674<sup>r</sup> upon stripping her Sheathing off, all her Rudder-Irons under Water so much decayed, that she was supplied with new ones, likewise all the Bolt-heads under Water in the but-ends of her Plank quite eaten off, and most part of the Heads of the Ryder-bolts, and the Bolts in the Scarfs of the Keel and Stern.

vid. *Answ.*  
pag. 3c.

King-  
fisher,

Sheathed 1677. stript off in *Nov.* 1680. and her Rudder-Irons under Water found so much decayed, that she was supplied with New ones; likewise all the Bolt-heads under Water in the but-ends of the Plank were quite eaten off, and most part of the Heads of the Ryder-bolts, and the Bolts in the Scarfs of the Keel and Stern, all the Rings that were clenched on the ends of her Bolts were eaten off, and the ends, and the reaching of the Ship crackt every seam of her from the rung-heads upwards, so that upon a Survey of the Shipwrights, the Sheathing was ordred to be taken off. See Mr. *Jos. Shishes* Letter, 15 Decemb. 1682.

Wool-  
wich.

Sheathed 1677. repaired in *July* 1681. and the sheathing taken off, by reason the Plank was



was defective under Water, and the Rudder-Irons so much eaten with rust, they were forced to unhang the Rudder, and new hang it again.

Sheathed, *Octob.* 1677. she had a new set of Rudder-Irons 27 Months after the former, being very much eaten, and the Lead was forced to be cut away in many places, for the seams being crackt, she is now in want of another sett of Rudder-Irons. See *Mr. Jo. and Tho. Shishes Letters*, 15 Decemb. 1682.

Assistance.

Sheathed in 1672. in her Voyage from *Tunis* to *Tripoly*, her Rudder wrought it self out of the Irons, hanging only by the uppermost Pintell, the Irons were very much decayed, and the ends of the Pintels eaten away, they made a shift to hang it again, Flemish Fashion, securing it with a Top-chain; after that, when she was at *Martha*, her Rudder was unhung again, and the Irons shifted, and when she came to *Leghorn* to carreen, the Rudder was had on shoar, and fixt with new Irons, and 4 or 5 new Stirrups put to secure the false Keel: Upon the Ships being in the Dock at *Chatham*, 1677. the Rudder-Irons under Water were found very bad and much eaten, and wasted away, but the Braces and Gudgeons very good and serviceable, most of her Bolts under Water also found in a very bad Condition, being likewise very much eaten and wasted. See *Certificate from the Officers at Chatham*, Apr. 20. 1678.

Henrietta.

vide *Answ.* pag. 13.

*Strip* 1678.

† All must be equally decayed, if the Lead-sheathing were the Cause.

D

Sheathed

**Mary.** Sheathed 1672. in 1677. her Stirrups both afore and abaft of the false Keel found quite eaten and unserviceable, as also the Staples are quite decayed, the Pintells much eaten with rust, and too small for the Gudgeons. See Officers at Portsmouth. Certificate, Apr. 20. 1682.

v. Mr. Medbury's Letter. p. 78.

*Note.* There were only Eight of these Ships complained of by the Navy-Officers, when they made their Report 28 Octob. 1682. but they having afterward given in this Scheme of Complaints to the Commissioners of the Admiralty 20 Dec. following, to do them right, this last is Printed: To some of which no Answer is given, as wanting opportunity to enquire, or not thinking it necessary, the Answers to the rest, with what is hereafter said in the Certificates, sufficiently proving the constant inequality of the Iron-works duration on all Ships, (some of the Lead-sheathed Ships Iron-work lasting much longer than others, and also than others sheathed with Wood), so that the Lead-sheathing can be no ways chargeable with the decays in the Iron-work.

The Lords Commissioners of the Admiralty having read the foregoing Reply to the Officers of the Navy's Report, thought fit by one of them, a Member of the Privy Council, to lay the same before that Board, who being attended by both sides, upon hearing were pleased to make the Order following, viz.

At



*At the Court at White-Hall,*

*Decemb. 22. 1682.*

Present,

*The KING's most Excellent Majesty  
in Council.*

**I**T is this day Ordered by his Majesty in Council, that the whole Matter contained in the *Report* of the Officers of the Navy to the Right Honourable the Commissioners of the Admiralty, this day read at the Board, and the *Answer* thereto from Sir *Philip Howard* and Company, relating to the Sheathing his Majesty's Ships with *Lead*, together with the other Paper then also delivered and read, from the Officers of the Navy; and what new Matter was further mentioned by them in Discourse upon the same Subject, be *Referred* to the said Commissioners for executing the Office of Lord High Admiral of *England*; who

upon the full and distinct Examination of the same, and Hearing of all Persons concerned therein, are to make their Report upon *each Article* thereof in Writing to this Board; with particular regard had therein to the shewing the *differences of Charge* that has attended his Majesty, whether in *Iron-work* or otherwise upon the *Hulls* and *Rudders* of the several Ships that have been sheathed with *Lead*, and those that within the same time have been either Sheathed with *Wood*, or sent to Sea *Unsheathed*. And if upon Examination it shall appear that *Lead sheathed-ships* do sustain greater damage in their *Iron-works*, than those Sheathed with *Wood*, or *Not* Sheathed at all, what the same is truly to be imputed to; whether to their *Lead*, *Nails*, or what other *Cause*. In all which the said Commissioners are to report to this Board the *Truth* of the *Fact*, as the same shall upon *Examination* appear to them, with their *Opinion* touching the same, and what upon the whole Matter may be most for His Majesty's Service to be

be done therein, with relation to the  
ceasing or continuing the said Me-  
thod of Sheathing.

*Francis Gwyn.*

Hereupon Sir *Philip Howard* and Company  
further applyed themselves to the Lords Com-  
missioners of the Admiralty in their humble  
Memorial following, viz.

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To

To the Right Honourable,  
**The LORDS,**  
 His MAJESTY's Commissioners,  
 For executing the Office of  
**Lord High Admiral of England.**

The Humble *MEMORIAL* of  
*Sir Philip Howard* and Company,  
 Interested in the  
 Manufacture and Invention  
 OF  
**Milled-Lead.**

*Shewing,*

**T**Hat His Majesty and my Lords of the Council having (out of the same Consideration of its Importance to the King, which led your Lordships first to the laying it before them) been pleased by their Order of 22 Decemb. last, to Referr back to your Lordships the Business in Controversie between the Officers of the Navy and this Company touching *Lead-sheathing*:

ing : These are humbly to acquaint your Lordships that as we are, and shall at all times be ready to answer any Commands which you shall think fit to direct to this Company in relation thereto ; so do we hold our selves bound, in Right no less to his Majesty and your Lordships than our selves, to remove a Prejudice which the said Officers did lately offer at the raising (before his Majesty in Council) against what we had then, and may yet have further Occasion of saying in this Debate, by a suggestion of our being governed by Considerations of *Self-interest*, while *themselves* would be thought removed above all suspicion of any other End herein than that of *His Majesties Service*.

In *Answer* whereto we shall only crave leave to say, That as to that Uninterestedness so pretended to by them, it is too manifest, that their obtaining from your Lordships a suddain Condemnation of this Method of *Lead-sheathing*, is the only Expedient they have for preventing the Effects of that Enquiry (which the Wisdom of His Majesty and the Lords of the Council have been so pleased to recommend to your Lordships) into the particulars of our Answer, leading your Lordships to the several Failures in Duty and breach of Orders reflected on them by us in relation to this Affair, and the Prejudices sustained therefrom by his Majesty.

And for what concerns the *Self-interest* suggested to lye on our side, we shall only Note,

1. That under all the Discouragements and Oppositions our Invention has for twelve Years together been treated with by them, we never have given them nor our selves the trouble of making one Complaint to his Majesty or your Lordships concerning them, saving what has been extorted from us in our necessary Reply to their late Report to your Honourable Board on this Subject ; nor in the whole four Years last past ( wherein they have for ought appears both without, and contrary to Order, taken upon them the Exercising, even *that*, which is the very Matter of the present Controversie, namely the Adviseableness of laying aside the use of *Lead-sheathing* ) have we ever made one Application to them for removing, or so much as enquiring into the Reason of their so doing.

2. That had there been the least sollicitude on our parts after our private benefit, it would have easily prompted us to a much greater reservedness of Style than your Lordships find us using on this occasion towards the said Officers, upon whose *good-will* alone the success of ours, and all other Contracts with the Navy, is well known wholly to depend : Nor does this *Company* need to appeal to any other Evidence than your selves for the Fidelity of their Proceeding in this Matter towards His Majesty, in preference to any thoughts of private Advantage, after that Declaration under our Hands, wherewith we Prefaced our very first Paper to your Lordships on this Occasion ;

not

not only of our Consent but Desires, that No Considerations relating to the Interest or Right of this Company, might stand in the way of whatsoever His Majesty and your Lordships should think most for his Service to determine concerning it.

3. That (besides the many other Advantages arising to His Majesty from this *Invention*) the saving of his Treasure will we donbt not in your Enquiry be found concerned in a no less Degree than that † of 60 l. or a much greater summe *per Cent.* through the whole of his Expence of *Lead-sheathing* compared with that of *Wood*, or sending Ships to Sea *Unsheathed*: Upon which Consideration, and of the good Husbandry the present State of his Majesty's Treasure, seems in so particular a measure at this time to call for; as also for our fuller Discharge against the Consequences of any Mistake that may attend the issue of a Debate of such Importance to the Royal Navy of England, We do on his Majesty's-behalf humbly pray, and must take leave to insist upon with your

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Lord

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† 60 per Cent. was thought fit as encouragement enough to be mentioned, though Mr. Pepys who also penned this Memorial with Sir Ant. Dean and Mr. Hewer, found by their Calculations the King had and might save by the use of this *Sheathing* above 150 per Cent. besides the great benefit of securing the Hulls of his Ships against the *Worm*, without hinderance to their sailing: Their Calculations the Publisher hath in Mr. Hewer's Hand-writing by him.



Lordships, not only that the Contents of our late *Reply* in this Cause may receive your due Construction and Examination with respect to what we have therein, and do still assert touching the True Causes and Remedy of the Evil in Controversie about Ships *Iron-works*: But that whatsoever your Lordships shall in Order to his Majesty's Service (which alone we again desire your having any regard to) find Cause of requiring further from the said Officers on this Subject, may be mutually transacted between us in Writing, and not otherwise: In which we shall endeavour to acquit our selves with all faithfulness and Duty to his Majesty, and no less submission to your Lordships, as becomes

My LORDS,

*Your Lordships, &c.*

The Lords of the Admiralty's Commission being determined, before they had proceeded to make any Report herein, and King *Charles* the second taking in to himself the Office of Lord High Admiral of England, which was transacted by his Brother, Mr. *Pepys* being Secretary, and Sir *Anth. Dean* and Mr. *Hewer* (the one always a professed Friend to the Thing, and the other not only so, but to that time a Partner also for a twelfth share in the Work) being made Commissioners of the Navy, the Mill'd-Lead Company could not but expect their  
Lead-



*Lead-sheathing* would soon be *restored* by the Power of these Gentlemen, they having thoroughly *Examined* the Matter, and informed themselves of the *great Benefit and Advantage* this Sheathing had and might bring to his Majesty's Service, as *hath been shewn*, and by the Post they were in, it now becoming their Duty also, so that they did not much *press* their Work, waiting only to be called for, as soon as it should be thought convenient; but much time being lost under these Expectations, at length Complaining of this Delay to their late Partner, Mr. *Hewer*, he advised them (not to Petition the King as they intended, but) to present a *New Proposal* to the Board to do the Work *per Yard square*, without any Reflection or Notice of the former Proceedings, saying, they that had been against it, must needs be convinced of their mis-information which had caused the Prejudices they had formerly conceived against *Lead-sheathing*, the whole Matter being so clearly stated, and this Sheathing so well vindicated in the Company's Reply which they had had so much time better to examine and consider of; and that they would take this way of application to them well, and we needed not to doubt the better and speedier success. Wherefore the 20 Decemb. 1686. the Company presented the *Proposal* following, which they leave still before the *Navy-Board*, in hopes at one time or other they will find reason and leisure to take the same into further consideration.

To

To the Honourable  
 The Principal  
 Officers and Commissioners  
 OF HIS  
 MAJESTY'S NAVY.

*A Proposal of Mr. Kent and Partners concerned in the Work of Mill'd-Lead, to Sheath his Majesty's Ships with the said Lead, for preservation of their Plank against the Worm, which way of Sheathing is plainly much better for Sayling, cheaper and more durable than any other way hitherto used.*

IT is humbly offered to your Consideration, that when this way of *Milling Lead* for *Sheathing* of Ships was first invented, it was immediately communicæd to the late King, and

and his present Majesty then *Lord High Admiral of England*, and the Usefulness of the *Invention* by them well weighed and considered, and thought to be of such consequence, that his Majesty gave the *Inventors* encouragement and advice to lay the same before the *Parliament*, where, after a most strict scrutiny into the Matter in both Houses, they obtained in the Year 1670. an *Act of Parliament*, with Terms in it highly expressing the good Opinion they had conceived of this *Invention*.

After which by his Majesty's particular direction it was first tryed upon several of his own Ships; but the interest several Persons (trading in the Materials formerly used in *Sheathing*) had to oppose this *Invention*, did make them very iudustrious to raise Objections against it, all which being throughly examined by his late Majesty, and a View by him in Person made of the Ship *Phoenix* after two Voyages to the *Streights* with the same *Sheathing*, it pleased his Majesty by his Order of 20th. Decemb. 1673. to signifie his pleasure that for the future *this way of Sheathing* and no other should be used upon his Majesty's Ships, by the then Lords of the Admiralty, in these words, *viz.*

*After our hearty Commendations; in pursuance of his Majesty's Pleasure signified to us by himself, at this Board; That in regard of the many and good Proofs which had been given of the usefulness of Sir Philip Howard and Major Watson's Invention of Sheathing his Majesty's Ships with Lead, in preference to the*  
doing

doing of it with the Materials, and in the manner anciently used, and with respect had no less to the charge thereof, than the effectual securing the Hulls of his Majesty's Ships against the Worms, his Majesty's Ships may for the time to come be sheathed in no other manner than that of Lead, without special Order given for the same from this Board: These are to authorize you to cause this his Majesty's pleasure herein to be duely complied with. And so we remain

Your Loving Friends,

Anglesey.  
Ormond.  
G. Carteret.

And after two Years further experience, the then Navy-Board thought it for his Majesty's Service to Contract with the Mill'd-Lead Partners for the Materials to sheath his Ships at the Rates expressed in their Articles of Agreement during their whole term of their Act of Parliament. And thus stood the Matter 'till the close of the Year 1675. at which time (as we humbly conceive, by the Artifice of the interested Traders) was raised a Clamour never heard of before, as if this way of Sheathing did occasion a more than ordinary Decay of the Rudder-Irons.

This immediately put the Partners upon a strict enquiry into the Truth and validity of these Objections, and it was not long e're they fully

fully discovered that this decay in the Iron-work proceeded not from the contrariety of the Nature of *Lead* with the matter of *Iron*, but that the *Iron-work* lasted or decayed, as it was better or worse mixt and wrought by the Smith, for such different decays as are charged could never proceed from one common Cause: His late Majesty himself was convinced that there was not such corrosive quality in *Lead*, having consulted the Person in *England*, the most skilful in those matters. Mr. Boyle.

Furthermore, Universal Practice both in his Majesties Yards, and Merchant Builders has and does at this day make *Lead* the common security of *Iron-work* against Rust, not only by covering therewith (upon all Ships unsheathed, and designed for long Voyages) the *Iron-work* about the Rudder, but by capping the heads of their Bolts under water with pieces of *Lead* fixed to and nailed over the said Bolts.

Nor is this all, for at this day whatever Merchant Man, or Man of War is appointed for a Voyage, where the *Worm* eats, the back of her *Stem-post* and beard of her *Rudder* are sheathed with *Copper* or *Lead*, and this even where the Ships also are sheathed with *Wood*, the *East-India* Company it self, (upon whom we may best depend for Cautions wherever preservation of Ships is in question) not omitting in that very case to sheath their *Rudders* with *Lead* or *Copper*, which practice certainly could never have prevailed with our Fathers, and been followed with so continued a consent to this very day by us, of the vicinity of either of these Metals, assisted (as is by some  
imagin-

imagined, ) by salt-water, had been ever found of so pernicious and certain ill effect upon the very matter they are employed to secure.

Nor does what is thus approved of in the general and universal practice of *England* want its Confirmation by the like of Forraign Nations, to wit, the *Dutch*, *Portuguese's*, *Spaniard* ; the first of which like us do generally sheath their *Rudder-Irons*, and the back of their posts with *Lead* or *Copper*, upon all Ships bound in the way of the *Worm* ; and for the two latter, not only the Rudders, but the whole Bodies of their Ships under water, even of the *Gallions* themselves, have of long time been, and are well known at this day to be entirely sheathed with *Lead*, which concurrence of these two latter Nations, seems in this case so much more considerable than any other, by how much not only their Voyages are the longest, their hazards therein from the *Worm* the greatest, and Cargoes the most valuable of all that Navigation knows, but for that the *Hulls* of their Ships abound the most with Iron-work, as having all which in the fastening of our Plank is performed with *Wooden Trunnels*, done by them with large *Spikes* of *Iron*.

In fine, were this spoil of Iron-work chargeable with nothing but what is contained in the *Lead* and *Nails*, these pretended effects of theirs would be *constant* and *uniform* in all Ships alike sheathed ; whereas nothing is more frequent than the instances of their *Inequality*, and this Company dare put the whole Credit of their Cause upon that one Issue, *viz.* of ever finding an equal Consumption of the Iron-work

work under water, whether upon the same or different Ships at any one time, or equal distances of time : The complaint of Ships that have passed this way of sheathing affording a most ample proof of this *inequality*, by having some of them loaden with Complaints, and every one different from the rest, and at different times from it self, whilst we are yet to be told whether the rest are not ( as we are sure by the long lasting of the *Iron-work* some of them were ) free from all ground of this Complaint, and upon Information of several *Masters* of Ships and other Sea-faring Men, even upon Ships that were sheathed with Lead, or not sheathed at all, they have found the Rudder-Irons of some to decay much sooner than others, which they alwayes imputed to the Smiths different mixture, welding and working of the Iron.

To justifie therefore the goodness and usefulness of this their Invention, the Partners in the Year 1678. made a *Proposal* to the then *Navy Board*, to furnish the *Rudder-Irons* for the Ships they should sheath, in which they would take care themselves of the good mixture, welding and working thereof, which *Proposal* was thought so reasonable that upon it several repeated Orders to that Board were made by the Lords of the Admiralty.

Thus stood the matter in the Year 1678. about which time some differences arose amongst the Partners themselves, which gave an interruption to their Proceedings, and an opportunity to those whose Interest it was  
(by

( by reason of their respective Trades ) to *de- cry* this *Invention*, though it was apparently of so great advantage to the Kings service ; but at present all differences being reconciled, and the Interest in the *Act of Parliament* fallen into such hands as are both willing and able to set it on foot, they thought it their Duty to lay a *new Proposal* before your Honourable Board, which they do the more gladly, for that they know you all to be Persons thoroughly acquainted with, and skilful in these Matters, and most Zealous in the Profits and Interests of his Majesty.

They crave leave to begin with reminding you of some Arguments, which no doubt have formerly lain before some of you, of the *advantage* that will accrue by the use of this way of sheathing above that of *Wood*.

*First*, That the only competent and allowed defence of Ships against the *Worm*, before this of *Lead-sheathing*, was the paying the *Hulls* from the waters edge downwards with *Stuff*, and laying the inside of a sheathing board (from inch and quarter to three quarters thick) all over with *Tarr* and *Hair* to be brought over the forementioned stuff ; and (being well nailed) *graving* or *paying* the outside of the said Board all over with another composition of *Brimstone*, *Oyl*, and other Ingredients, which is called *Wood-sheathing*.

*Secondly*, Concerning which, however united the opinions of us *English* men may be thought to have been touching the same, it seems



seems to this Company grounded not so much upon the real perfection thereof, as the profit that attends it to the *Builders* interested in the working of it, and consequently leaving them under no temptation either to look out for a better themselves, or give encouragement to any discoveries made towards it by others.

And that indeed the so universal reception given to *Wood-sheathing* is rather due to this, than its own real sufficiency, you will be Judges of from the following Notes.

1. That if not the most, at least the most essential of all the Ingredients, employed in that method of *Sheathing* are of *forraign* growth, which they make use of not so much for the sake of the Nationality of its Argument, (though yet that is such as the Parliaments of *England* have ever laid great weight upon in all their Deliberations upon Trade, and particularly in the *Act* relating to this very *Invention*) but from a consideration, which the Books of the *Navy* sufficiently confirm the force of, *viz*, That being *Forraign*, such has sometimes been the scarcity thereof here, (even when their use has been the most wanted,) that they have been either not to be had at all, or at Prices much exceeding the ordinary Market; whereas the *Materials* used by the *Copartners* are of the *Product* of *England*, and so can never be wanting.

2. That

2. That the *Wood-sheathing* hath been alwayes observed and confessed to be very apt to gather *filth*, and of no less uneasiness when fould to be throughly cleaned again.

3. That from its *roughness*, and the multitude of Nail-heads standing out from the Ships side, or otherwise, and the *thickness* of the *sheathing* it self, Ships sheathed with *Wood* have ever been complained of as lessened thereby in that only quality, upon which our *Friggats* most value themselves, and have their service in preference to others calculated from, namely, their *Sailing*.

All these Arguments they humbly hope have given you full satisfaction of the preference this way of sheathing ought to have, and likewise hope they have answered all Objections to it.

They crave leave therefore to begin their *new Proposal* with these Assertions.

1. That this sheathing with Lead, at the first hanging on, is, if at all, very considerably dearer than a good *Streights* sheathing with *Wood*.

2. That the *Wood-sheathing* never lasts above a Voyage or two, and when stript the old sheathing is worth little or nothing.

3. That

3. That this *Lead-sheathing* with some small repairs will preserve the Plank from the *Worm*, (which is the true intent of sheathing Ships) till it shall be required to be stript off for Calking, or other reparation of the Hull when that shall be necessary, but will never need stripping for any defect in the sheathing it self; and when it shall be stript, the old sheathing being *Metal*, will yield its value to melt down again.

*To reduce this Work to a certainty of great and undeniable Benefit and Advantage to his Majesty, they offer as followeth.*

1. **T**hat the Ships sides being prepared (and the *Bolt-heads* and *Braces* parcelled or capt as they ought) to bring the sheathing on, they will sheath the same with their *Lead* and *Nails* according to the Pattern now produced, which is near 3. *l.* to the foot square, in any of his Majesties Yards (convenient Room being assigned them to store their Goods) and defray all charge of Materials, Carriage, Workmanship, and wast at the rate of 11. *s.* 9. *d.* per Yard square, which upon due enquiry will appear to be very little more than a good *Streights* sheathing, and not above half so much as an *East-India* sheathing.

2. To

2. To keep the same in constant repair, they offer to deliver on board convenient Stores of *Lead* and *Nails* to supply Accidents if any happen in a Voyage, for which the *Carpenter* may be answerable, and as often as any of the Ships they shall sheath shall return home from their Voyages, any wise *damaged* in their sheathing, they will be obliged, upon notice given when they are Dockt, to repair the same, and so from time to time to keep the said sheathing in good and constant repair at the rate of 10. l. per Cent. per Annum. according to each Ships *first Charge* of sheathing, as long time as they shall desire to have the said sheathing continued on to the time of *stripping*, and then to allow for the old *Lead* 11. s. per hundred weight, whereas the *Wood-sheathing*, which seldom lasts above a Voyage, when stript yields nothing.

If any doubt yet remains, that this sheathing is the cause of a more than ordinary decay in the Rudder-Irons, they do offer, if they may have the making the Rudder-Irons themselves for such Ships they shall sheath, they will undertake the same at the Kings Rates; and to prevent all suspicion of hazard, while Ships are in their Voyages, they will at first sheathing provide two sets of Rudder-Irons to each Ship, one to be in store alwayes on Board to shift if occasion requires, and those not to be paid for till it shall appear that the first have lasted as long as the Rudder-Irons of other Ships usually do; and when the *Lead-sheath-*

*beathing* is thereby sufficiently vindicated from the fear of being any wise destructive to the Rudder-Irons, they may be made by the same hands they now are, again.

*All which is humbly submitted  
to your Consideration.*

20. December  
1686.

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LETTERS

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LETTERS and CERTIFICATES

From the

KING's Master-Builders,  
Carpenters, &c.

On behalf of the

Lead-Sheathing.

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*Sir Anthony Dean's Letter to  
Sir Francis Watson.*

*January 22. 1669.*

S I R,

“ **T**He Patterns of Lead you shewed me of  
 “ 4 l. to the Foot square, is absolutely  
 “ of great advantage to his Majesty, being  
 “ very fit for the Uses of the Navy, and will  
 “ serve for Furnaces, Sea-store, Caps for  
 “ Bolts, heads of Masts, and the like : And, the  
 “ Pattern of 3 l. and under is very fit to nail  
 “ under Knees, Standards, Carved-work and  
 “ Double-work, and would not do amiss for  
 “ Sheathing,

"Sheathing, if Nails can be found to last,  
 "which I thought convenient to be particu-  
 "lar in mentioning as well the size and weight  
 "as its Uses, to satisfy those who may be con-  
 "cerned.

*Anthony Dean,*  
 Master-Builder at Portsmouth.

## Portsmouth.

**T**Hese are to Certifie whom it may concern, that  
 the Mary and Lyon having been both on  
 ground at Portsmouth, we did view the Sheath-  
 ing upon the said Ships, which was done at Chat-  
 ham in the Year 1672. and do find it to be on ex-  
 ceeding well, the Salt-water having not eaten ei-  
 ther the Lead or the Nails in the least as we can  
 discern.

Mary.

Lyon.

*Dan. Furzer,*  
 Master-Builder.

*Rog. Eastwood,*  
 Assistant.

Feb. 2. 167 $\frac{1}{4}$ .

## Chatham.

**T**Hese may Certifie whom it may concern, that  
 the Ships whose Names are mentioned in the  
 Margent, were sheathed with thin Lead at his  
 Majesty's Yard at Chatham, prepared and made  
 after the New Invention, the Mary having been  
 here in the Dock since she was sheathed, her sheath-  
 E ing

Lyon.

Henriet-  
 ta.

Mary.

ing lay all very firm, smooth, and good as when first put on, and very clean; and I am of Opinion that the Lead made after this new Invention, being so close pressed, smooth, and equal in all parts, it is much more useful for Shipping, and cheaper than the Lead cast after the usual manner, this Lead after this new Invention being fit for all uses about a Ship, it being made to weigh 3, 4, or 5 l. to the Foot square.

Phin. Pett,  
Master-Builder  
at Chatham.

Chatham-Dock,  
Feb. 25. 167<sup>3</sup>/<sub>4</sub>.

### Woolwich.

Phoenix.

March 10.  
167<sup>0</sup>/<sub>1</sub>

Dread-  
nought.

June 1671.

Whereas his Majesties Ships the Phoenix and Dreadnought were above three years since sheathed by Major Watsons new Invention with thin Lead, and at their Returns after several foreign Voyages being ordered into his Majesties Dock at Woolwich, and committed to my care to search the condition of their Hulls; upon view thereof I do hereby certifie, (notwithstanding the fears the said Sheathings might have been prejudiced by the Cables, lying on ground, or some other Accident) That their Sheathings did continue very firm and fast, without the least damage from the first doing thereof, the Phoenix particularly having then made two Voyages into the Streights, was since sent a Voyage into Guinny without any Amendment.

Furthermore



Furthermore, His Majesties Ship the Bristol being in the beginning of April last ordered under my Charge to be sheathed, I sheathed her with the same sort of Lead and Nails in less than three days time, and the whole charge thereof upon the exactest Computation I could make, did amount to 258. l. 4. s. which is as little as she could possibly cost for an ordinary sheathing of Boards of 1. inch, well nailed. This I could no less than Certifie under my hand.

Bristol.

Apr. 1674.

Phin. Pett,

Master-Builder  
at Woolwich.

July 2. 1674.

## Sheernefs.

These are to Certifie, That about nine or ten dayes since his Majesties Ships the Henrietta and Phoenix, which are sheathed with Lead, were haled on Shore at his Majesties Yard at Sheernefs, the said Ships coming in thither from cruising in the Channel, the latter having made her Voyage into the Streights; and that I found the sheathing of the said Ships very firm and good, not at all damnified by the ranging of the Cables along the side, or by rubbing on the ground, or otherwise.

Henrietta.

Phoenix.

John Shish,  
Master-Builder.

Octob. 2. 1674.

**Phoenix.** These are to Certifie, That I was Carpenter of his Majesties Ship the Phoenix, in her Voyage from the West-Indies, or Barbadoes, in the Year 1674. Captain Atkins Commander, as we were coming home in a storm of Wind, receiving our fore course the Rudder snapt off, the waters edge being worm eaten quite through, the lower part tore away all the eyes of the braces under water excepting one, and so sunk, the upper part hung fast, which I hung over-board, and took off, unto which I fastened Planks to make a Rudder as well as I could; the reason of the Rudder being lost, was by the Worm eating it in pieces.

The Rudder  
not being  
sheathed high  
enough, no  
fault in the  
Rudder Irons  
nor Lead-  
sheathing.

Edward Ledger, Carpenter.

**Kings-  
fisher,**

These are to Certifie, That I Edw. Wright was entred Cooper on board the Kingsfisher, about four months before she was sheathed with Lead, and that her Rudder Irons (as I was informed) was put on her at Woodbridge about a year before, the Ship having afterwards lain in Chatham River till I entred, and I was on board her above two years and a half, at least two years in the Streights, Captain Trotter Commander. That she had none of her Rudder-Irons shifted all that time except one Pintel, which was broke, and amended at Legorne, and at her new Voyage when he left her about a year and a half agoe, she shifted none of her said Rudder-Irons. That in the said Voyage they did many times clean the said Ship as there was occasion, which kept clean much better than a Wood-sheathing: And when they had occasion in  
three

three or four months time or thereabouts, as they had opportunity, they used to Careen her with her Guns, and in half the time and trouble, with bristle brushes, provided for that purpose, they used to clean her as they had formerly done their board-sheathing, with which Jo. Ward her Carpenter, and Robert Bodenham her Boatswain, now in the Streights, were so much pleased, that they would often fall into commendation of that new way of sheathing, and the easiness of keeping it clean, and the great advantage thereby to the Ship in its Sailing.

Edward Wright.

Novemb. 22. 1682.

**W**E, whose Names are underwritten, Carpenters, employed about the stripping the Mill'd Lead-sheathing of the Assistance, at her coming into Mr. Castles Dock at Deptford, to be repaired in September 1686. do hereby Certifie the said sheathing lay on very very well and whole, from any galling by the Cables or rubbing off on ground, preserved its Plank smooth and sound, from any Worm eating as at first laying on, which was about ten years since.

Assist-  
ance.

Octob. 3. 1686.

Will. Bowerman;  
John Rumney.

*A Letter from the Master-Builders Assistant at Deptford, formerly Master-Caulker at Portsmouth.*

SIR,

Mary.

Plymouth.

Dread-nought.

“ After my hearty Service presented to you,  
 “ These are to acquaint you that I had  
 “ answered your Letter e’re this time, only I did  
 “ think it convenient to see how the *Mary’s* Bolts  
 “ proved at *Woolwich*, which I now understand  
 “ are very bad ; these Bolts have been drove 13  
 “ or 14 Years, which could not be expected any  
 “ better than they be, but the Plank is very  
 “ good, and so was the *Plymouth’s* and *Dread-*  
 “ *nought’s*, and not the worse for the Worm ex-  
 “ cept where the Lead was off, and that not  
 “ worth speaking of, but all Ships ( as far as I  
 “ see ) the Plank proved as good as those which  
 “ were sheathed with Board : As to the Bolts  
 “ and Braces, I dare engage they may be secu-  
 “ red in parcelling of them, and the Ships which  
 “ were sheathed with Lead very tight, when the  
 “ work was very open under the sheathing.

July 4. 1680.

*Zach. Medbury.*

*A Letter from the Master-Builder of  
Portsmouth to the Lord Churchill.*

*My LORD,*

“ **I** N Answer to your Lordships Letter, my  
 “ Opinion of Lead-sheathing is, That it is  
 “ the finest and cleanest Sheathing in the world,  
 “ and as for the destruction of the Bolts ; I say  
 “ when well parcelled, no defect can come  
 “ from the Lead-sheathing ; for I have made it  
 “ my observation, That where the Bolt heads  
 “ are carefully parcelled (as they are or ought  
 “ to be in a Wood-sheathing) no defect is  
 “ found, but where that is neglected, the wa-  
 “ ter getting between the Bolt-head and the  
 “ Lead, there both the Lead and Iron are usu-  
 “ ally decayed : But I find that his Majesties  
 “ Ships in ten or twelve years are generally  
 “ Iron-sick, whether sheathed either way or not  
 “ sheathed at all, by reason of the builg water.  
 “ And as to the Rudder-Irons, I find that the Pin-  
 “ tells decay soonest, but that an unconstant  
 “ and unequal decay in the said Iron are in all  
 “ Ships, is most certain, sheathed or not, and  
 “ according to the goodness and well work-  
 “ ing of the Iron, some prove of longer du-  
 “ rance than other, the soon decay I cannot  
 “ impute to the Lead-sheathing, but if such de-  
 “ cay were, hanging the Rudder Flemish Fa-  
 “ shion, ’tis easie to unhang the same, and up-  
 “ on such decay to hang on new ones, the Bra-  
 “ ces being much more durable than the Pin-  
 “ tells : And as Wood-sheathing requires to  
 “ be

" be stript once in three years, where the  
 " Worm eats, so my Opinion is, that a Lead-  
 " sheathing ought to be stript once in seven  
 " years, by reason of the Ochams decaying in  
 " the Seams ; (the which would lye on much  
 " longer, and be firm, were it not for such  
 " decay) and as to its fouling, it fouls nothing  
 " near so soon as a Wood-sheathing, and when  
 " foul is easily cleaned with brushs, or Scra-  
 " pers if barnicled, with very little trouble,  
 " it will also endure a handsome fire to dry  
 " the same if occasion requires ; and when  
 " this Sheathing is stript, the Plank is no wise  
 " damaged by the Worm as we ever found:  
 " This I hope gives your Lordship full satis-  
 " faction from

*Your Lordships, &c.*

*July 4. 1687.*

*Isaac Betts.*

*A Letter from Sir Phineas Pet, Com-  
 missioner at Chatham, to my Lord  
 Churchill.*

*My LORD,*

" **I**N Answer to your Lordships Letter, de-  
 " siring my opinion of the Lead-sheathing,  
 " and the Complaints that some have made a-  
 " gainst the Rudder-Irons and Bolts of seve-  
 " ral of the Lead-sheathed Ships, I return your  
 " Lordship this general Account following,  
 " which I suppose will give your Lordship  
 " full

"full satisfaction. While I was his Majesties  
 "Master Builder here at *Chatham*, it fell into  
 "my way to sheath and strip divers of those  
 "Ships, by which I had opportunity enough  
 "to make full observations, as well in re-  
 "spect of the Iron-work as sheathing; and I  
 "must confess after I had seen some of those  
 "Ships return from their Voyages, as the *Ly-*  
 "*on*, *Henrietta* and *Mary*, with their sheathing  
 "firm and sound, free from the Worm, and  
 "very clean, I look'd upon this sheathing as  
 "a very happy Invention for his Majesties  
 "Service, to have his Friggats thus secured  
 "from the Worm, without hinderance to their  
 "Sailing, which a thick Wood-sheathing must  
 "needs be; and by reason of its duration, the  
 "charge that was saved in Graving, and the  
 "value of the old sheathing (being Mettal)  
 "when stript must needs be considerably cheap-  
 "er to the King, and I am of the same Opi-  
 "nion still, though I have heard divers Com-  
 "manders and others say, this Sheathing is  
 "an extraordinary decayer of the Iron-work,  
 "which they may fancy by taking notice only  
 "of some particular Ships that perhaps may  
 "have had their Rudder-Irons last a shorter  
 "time with a Lead-sheathing, than they have  
 "observed some other Ships that have been  
 "sheathed with Wood, being not acquainted  
 "with the searching and repairs of Iron-work  
 "in Ships of all kinds as Shipwrights are; for  
 "this great inequality we constantly find in  
 "the lasting of the Rudder-Irons, and other  
 "Iron-work in all Ships, whether sheathed  
 "either way, or not at all, may not be known

“to them, which we always look upon to  
 “come from the Smith, in the better or worse  
 “mixing, welding, and working his Iron :  
 “Nor can I imagine how the Lead-sheathing  
 “should be any cause of the great decay in  
 “Iron-work, for we use in Wood-sheathing  
 “to Capp the Bolt-heads with Lead, and ma-  
 “ny times to sheath the Rudder-Post, and  
 “Beard of the Rudder with Lead. And for  
 “the Nails, their Heads are so thin and small,  
 “that I do not see how they should continue  
 “so long in the sides of a Ship, (as some of  
 “these Ships have been sheathed,) and at strip-  
 “ping appear not at all to be diminished in their  
 “substance, and yet communicate such a cor-  
 “roding mischief to the Iron-work as some  
 “would have it ; but if such a thing were,  
 “well parcelling the Bolts would secure them,  
 “and the Rudder-Irons can decay in no Voy-  
 “age so fast, but by having a fresh set always  
 “on Board, opportunity may be found time  
 “enough to shift them, which would very  
 “well be contrived, rather than to lose so many  
 “other great Benefits that Lead-sheathing  
 “brings with it to his Majesties Service as  
 “well as to the Publick. This is I think the  
 “substance of what your Lordship would be  
 “satisfied in ; and if you desire any thing more  
 “particularly, you may command

*Your Lordships most, &c.*

*April 12. 1688.*

Phin. Pett.

PURSER



# PURSEES Certificates for the Goodness of Sheathing- Lead to line the Bread- rooms.

**T**Hese Certifie, That the Bread-rooms of his Ma-  
jesties Ship Royal Catherine being lined with **R. Ca-**  
Lead, did very well preserve the Bisquet, insomuch **therine.**  
that during the term of her Voyage 1672 and 1673.  
there was not any Bisquet damaged.

Jacob Bryan.

**T**Hese are to Certifie, That his Majesties Ship **Fairfax.**  
the Fairfax Bread-rooms were lined with  
Lead about two years since, and that the said Bread-  
rooms was Bread for nine or ten years, which du-  
ring the said time was not removed, or stirred, and  
was at the expiration of the said time as good  
as when it was first put in, and received no da-  
mage by wet or damp to the prejudice of the Bread.

Jan. 24. 1674.

William Rivers.

SIR,

**Y**ou having a desire to hear how the leading **St. Da-**  
of the Bread room of the St. David, was a **vid.**  
pre-

preservation of the Bread, I do assure you, that if it had not been for the leading of it, it would not have lasted half so long; for I was two years in the said Ship, and the very last of our Bread did hold out to be as good as the first.

Jan. 5. 167 $\frac{3}{4}$ .

Wilm. New.

Happy  
Return.

These do Certifie whom it may concern, that the Bread-room belonging to his Majesty's Ship the Happy Return are lined with Lead, which Lead hath for eight Months together preserved the Bread from any Damage without being stirred, and it was in as good Condition as at first putting in.

Feb. 23. 167 $\frac{3}{4}$ .

Maur. Linch.

R. Prince.

These are to Certifie, that the Bread-room of his Majesty's Ship Royal Prince being lined with Lead, did very well preserve the Bisquet, insomuch that during the last Voyage betwixt 1 May, 1673. and 24. Octob. following, there was not in the term of the said Voyage any Bisquet damaged.

Triamer Pickstock.

These

**T**Hese are to Certifie, that the Bread-room of his Majesty's Ship St. George, being seeled with Lead, did preserve and keep our Bread in very good condition the whole time that she was at Sea. .

Sept. 10. 1674.

David Willis.

Perhaps it may be acceptable to some Readers, to have a glancing and shorter View of the *Company's Answer* to the Officers of the Navy's *Report* and Complaints to the Lords Commissioners of the Admiralty against the *Lead-sheathing*; and therefore it is thought fit that the Reader be entertained therewith, as the same was also drawn by the Pen of that ingenious Person Mr. *Pepys*, viz.

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A

Novem. 30.  
1682.

A  
B R I E F  
OF THE  
Controversie  
Depending between  
The Officers of the NAVY,  
AND  
Sir Philip Howard and Company,  
TOUCHING  
The late Invention and Practice  
of Sheathing his Majesty's  
Ships with L E A D.

**S**Ir Philip Howard and Company, Interested in the Manufacture of *Mill'd-Lead*, and Contraction for the same with the Officers of the Navy for the use of his Majesty, being surprized with a late Report to the Lords of the Admiralty from the said Officers in prejudice of this Invention, did (in right to his Majesty and his Service, no less than to it and them

themselves ) present their Lordships this Day with a *Reply* to that *Report*, containing an ample Deduction and State of the whole Matter, whereof the following is an Abstract :

*Shewing,*

**T**HAT this Company becoming Masters of the said Invention, *Anno* 1670, they in the same Year submitted it (as a Matter of publick Import) to the Examination and Censure of *Parliament*. Where after passing the most solemn and strict Methods of Inquisition in both *Houses*, it received their Approval and Confirmation, by an Act granted to that Effect, in Terms most Expressive of their satisfaction in it, and Intentions of Encouragement to its *Inventors*.

After which, it was by his Majesties Command immediately put in Execution, first upon the *Phoenix*, and then successively upon other of his Ships. But not without continued Industry and Combinations employed against it, by Persons interested so to do, until by a three years proof of its Efficacy, in contradiction to all that had been objected against it, and more particularly from the satisfaction his Majesty received concerning it, in his personal View and Observation of its success upon the *Phoenix*; he was pleased to put an end to the same in the Year 1673. by an Order from the then *Lords of the Admiralty*, solemnly establishing this Method of sheathing, in Exclusion to all that had been till then used in the Navy.

Not-

Notwithstanding which, the said *Officers* thought fit to take yet two *Years* more for its Probation, (in all *five Years*) before they would make it the *King's*, by entering into any *Contract* for it with this Company: Which then (*viz.* in the Year 1675.) they did, and that not only with a Condition of securing the benefit of it to his Majesty for *Twenty Years* to come, (which was the whole Term the Company had then remaining in it) but an expresse Declaration of their entering into this *Contract*, *Upon sufficient experience had of the goodness and usefulness of this Invention, both as to the Lead and Nails.*

All this nevertheless not sufficing against the Private Interests concern'd to expose it; a new Exception was soon after rais'd, upon the score of a Pretended Discovery made of some Occult Quality in the Lead, by which the *Rudder-Irons*, and other Iron-works of his Majesties Ships under water were said to be in an unusual Degree eaten and corroded with Rust.

Upon which his Majesty and the *Lords of the Admiralty* did by several and repeated *Orders* in the Months of *April* and *May* 1678. not only recommend and press upon the *Officers* of the *Navy*, the making a strict Enquiry into the General Truth, and Natural Ground of the Evil so complain'd of; but upon a reasonable suggestion then made by this Company, of its being rather chargeable upon some Defect in the *Iron-work* it self, than ought to be apprehended from the Lead, They were pleased to direct several *Ships* to be expressly fitted,

ted, and other things done by the said *Officers* in conjunction with this Company, in order to the better discovery of the Truth in that Particular ; but without any regard shewn either to those *Orders*, or to the Importance of their Contents to his *Majesty*, by any thing that appears to have been done towards it by the said *Officers*, from that very day to the Date of this Report in *October* last, wherein (upon the single score of its suppos'd Influence upon *Iron*,) they take upon them peremptorily to Advise against the further use of *Lead-sheathing*, without any other Evidence of the Truth or Ground of that their Supposal, than what is to be inferred from a Particular thereto annex'd, of the Decays of *Iron-work* observ'd upon some of the *Lead-sheathed* Ships.

The invalidity of which Instances being severally opened by this Company, with respect no less to their Truth, Consistencies, and Cogency, than to their Disproportion in Number to those of the like sheathing, against which nothing of Complaint has been suggested by them ; The Company proceeds to shew,

I. That the sheathing of Ships with *Lead*, neither is nor can (as such) be the Cause of any decay in *Iron* : And this,

1. From the Universal Consent of Persons of the most allowed Knowledge in the *Theory* and Operation of Metals.

2. From the Universal *Practice* (both Ancient and Modern) of the *Shipwrights* of *England*,

*land*, in their special Application of Lead to the preserving of *Iron-work*.

3. From the like Practice in *Forraign Nations*.

4. From their Observations touching the unequal growth of Rust upon *Iron-work*, within the same or different spaces of Time, and on the same or different Ships, however *sheathed* or *unsheathed*.

II. That the Real *Causes* to which alone this extraordinary decay of the *Iron-work* is of right to be imputed, are,

1. The want of due *Inspection* to the performance of the *Smiths Work*.

2. An industrious *Omission* ( in the particular Case of these Ships ) of the Principal Point of Care used both in his Majesties and Merchants Service, in the preparing of all Ships designed for *sheathing*.

3. An Unaccountable *Continuance* of the *sheathing* upon the Bodies of these Ships, beyond what the Practice and Rules of the Navy, in the case of any such Neglects can justify.

III. Lastly, That an Enquiry into the *Books* of *Iron-work* in his Majesties Yards, is the only, and would long e're now (had this Company's Advice been pursued) have been found an effectual and certain Expedient for the coming to a right decision of this Question.

Which being said, and an Account given of the several *Obstructions* and *Discouragements*, which



which both his *Majesties* Service, and this *Company* have met with from the Officers of the *Navy*, in all its Endeavours of bringing this Matter to a Satisfactory Issue to his Majesty: The *Company* concludes with shewing these three things,

1. That sheathing with *Wood* (the only security for *Ships* against the *Worm*, before this of *Lead*) is, and has always been owned to be, attended with several Circumstances greatly Detrimental to his Majesty, both in his *Ships* and Service.

2. That the only Expedient also, besides this of *Lead*, for obviating those Evils in *Wood-sheathing*, has been the flying to another *Evil*, no less fit to be avoided than they, *viz.* That of sending the *Kings Ships* into the *Worms* way *unsheathed*.

3. Lastly, That therefore the only Method in reserve (yet known) for the serving of his Majesty herein, is this of *Lead*. Against which, none of the Evils in either of the former, or any other, are (after near *Twelve years* Experience of it) so much as suggested by the Officers of the *Navy* themselves at this Day, saving this under dispute concerning *Iron-work*; To which, (after all) the *Company* closes with Proposing a most obvious, easie, next to chargeable, and effectual *Remedy*.

For the Particulars of which, and each of the foregoing Matters, reference is to be had to their *Original Paper*, lying before his Majesty and the *Lords* of the *Admiralty*; whereof this is only an *Abstract*.

HAVING

**H**AVING in the foregoing part of this Discourse entertained the Reader with the Transactions that have passed concerning the Mill'd Lead used upon the sheathing, &c. of about twenty Ships of the Navy Royal, I shall now set forth the great *benefits* and *advantage* accruing from the use of this sort of Lead for the covering all manner of *Buildings*, and other purposes where *Sheet-Lead* is employed, which the Mill'd Lead Company some time since also proposed to their Majesties Officers for *Buildings* and *Ordinance*, at rates greatly cheaper than what was or is paid (with respect to the work done) for Cast-Lead, which they had demonstrated to be much better as well as much cheaper, in a sheet of Paper Printed and Published some Years ago, for general satisfaction, but could not prevail with those Officers by all their Printing, Proofs, or Proposals, it being against the Inclinations or Profit of the Plumbers and their Friends, who had Power or Interest enough to hinder the admittance thereof into the Kings Works, which being further proved by fresh Instances of Experience from Coverings of Houses, &c. both wayes done since the Rebuilding of *London*, lately also published, the same here follows *in terminis*, for the better satisfaction of those who have the disposal of their own Money.

AN  
ADVERTISEMENT

To all who have Occasion to make Use of

Sheet-Lead.

ALL New Inventions ( being proposed ( as better and cheaper ) to lay aside something before used for the same purpose ) must expect to meet with great Opposition ; for some particular Persons, and some Trades which consist of many Persons being concern'd in Point of Interest, right or wrong, they will decry that which is against their profit, and procure as many others as they can to do so too ; this being the Case of the *Plumbers* with those Concerned in the *Milled-Lead*, whoever has Occasion to make use of *Sheet-Lead* ought not to regard what interested Persons say on either side, but to weigh and consider with himself the Reasons offered, and to examine the truth of what's said on both sides : The *Mill'd-Lead Company* have Printed many of their Reasons some time since, in a Paper at large : amongst which, to say nothing of its solidity, smoothness, &c. the *Equality of Mill'd Lead* alone is sufficient to prove it much better

ter, and (at the Companys Rates in proportion to the least *Inequality* that can be granted in *Cast-Lead*) much cheaper, which also may further appear from the Considerations following.

1. It is agreed by all, that if the *Plumber* could cast his Lead exactly Equal to the thinnest part thereof, it would be better than to be thicker in one place than another, so that the excess of thickness is not only unnecessarily paid for, but it makes the Sheet worse, and helps to crack and cockle the thinner parts, by its stronger resisting the Sun-beams, and other Accidents of Weather, which falling equally on all parts alike, draws the thinner parts, when the thicker stay behind, which causes that Cockling and cracking therein: Wherefore, if Mill'd Lead be thicker than the thinnest part of a cast Sheet, it must be allowed to be better, and to last longer, and a less quantity of Lead being employed, it may be cheaper to what degree in proportion to *Cast Lead* the Customer shall judge it convenient and sufficient for the purpose designed to have the *thickness* of his Mill'd-Lead to be of.

2. The wasting and decay of *Sheet-Lead* being chiefly beneath by the heat and moisture contracted between it and the plain it lyes on (turning it into *White-Lead*,) that accident which the *thinner* as well as the *thicker* parts are alike liable to, shews the great mischief that attends a *Cast-Lead* covering in this respect also.

3. These

3. These particulars as well as the *Plumbers* vain pretence to near *Equality*, and endeavour to cast as equal as he can, shews the excellency of *Equality* in *Sheet-Lead*, and consequently that it is so much the worse, by how much it deviates from *Equality*, and this *Inequality* in a sheet of *Lead* being an Object of Sense, any Man that has but his eyes in his head may be as good a Judge thereof as the best Architect, Surveyor or Plumber in *England*; and if he please but to give himself the trouble of viewing indifferently the *Coverings* upon Houses in *London*, since the Rebuilding, and cut a snip from the *thickest* and *thinnest* part of the edge of any Sheet he can come at, he will generally find *Cast-Lead* to be a third, or at least a fourth part thicker, nay, many times above twice as thick in some places as in others, and the *Coverings* for the most part *crack'd*, *cockled* and *patcht* with *Solder*, if they have not been new laid, as many have been since the *Fire*, particularly the *Royal Exchange* and *Cordwainers-Hall* new covered four or five Years ago; the *Kings Head*, a Confectioners by *Ludgate*, part new covered about seven Years since, and the new as well as the old crack'd, cockled, and patcht with *Solder*; the *Eagle* and *Child* in *Tower-street*, stript and new laid in 1676. Mr. *Clark's House*, next the

Since the Rebuilding of the City, and the first Notice of Mill'd *Lead*, the *Plumbers* to make their *Coverings* seem cheaper, have generally cast much thinner than formerly, which hath produced these ill Effects in so short a time, tho in more ancient *Coverings* the same Inequalities and defects proportionably may be seen.

*Bell*

*Bell* in *Fryday-street*, and abundance more new Covered, too long here to mention; and where the old ones lye, this decay and patching generally appears: Whereas such Coverings as have been laid with *Mill'd-Lead*, some not above 6. l. to the Foot, ten or twelve Years ago, lye as well as at first laying, and in all probability will so continue many Years, as to instance in a few: At Mr. *Wdgstaffe's*, next the Hand and Pen in *Rood-lane*, a Covering about 30 Foot square, with Sheets the full length; Mr. *Miners's* Buildings in the *Inner Temple*, with Sheets 22 Foot long, where a Covering of Cast-Lead by, at the same time laid, being compared, the Defects complained of will plainly appear, in *this*, while *that* continues as well as at first, at Mr. *Graydon's* House in the *Pell-mell*, and divers others too long also here to mention; besides many more in Town, and some great Houses in the Countrey done since, as Esq. *Sanders's* at *Tooting*, some Sheets 34 Foot long; Esq. *Tilney's* new House near *Rotherwick* in *Bark-shire*; Sir *James Hayes's* at *Bedgbury*, and Esq. *Vane's* at *Fairlaune* in *Kent*, &c. of different kinds, worth viewing for Beauty and Imitation.

4. There are besides the *Inequality*, certain defects in *Cast-lead* that lye concealed within the Sheet, not appearing on the superficies, called by the *Plumber Blow-holes* and *Sand-holes*, which often happens in *Casting*, and must help forward the decay of those Coverings, which the *Mill* discovers, such *Holes* being enlarged

as the *Sheet* lengthens in *Milling*, (and not closed up as they falsely suggest) and where these *Holes* or *Breaks* are met with, the *Sheet* is cut, if long enough for use; if not, all's returned again to be new Cast, so that none but *sound Sheets* can pass the *Mill* twenty or thirty times, as every *Sheet* does before it is finished.

5. Let us suppose then the present price of *Mill'd-Lead* to be 16 s. a hund. and *Cast-Lead* 14 s. which is an *eighth part* less, whatever the *Inequality* of a *Cast-Sheet* shall appear to be above an *eighth part*, which is not easily discerned, so much must it be granted that *Mill'd Lead* is cheaper; but if *Mill'd Lead* of 7 *lib.* to the foot be admitted but to be as good as the *Plumbers* pretended 9. l. it is cheaper at 16. s. a hundred than his at 12 s. 6 d.

6. Wherefore since 7 *lib.* to the foot may very well be allowed, to remove all *Objections* at once which the *Plumbers* and their *Friends* falsely charge the *Mill'd-Lead* with, any Person (using the *Plumber* the *Company* shall recommend or approve) that shall lay a *Covering* with their *Lead* of 7 *lib.* to the *Foot square*, they will undertake (and secure him by good *Covenants* as *Council* shall advise) to keep such *Covering*, not exceeding a 100 l. value, in good and constant repair for a term of 41 Years (to mention a time certain and sufficient) for 5 s. a Year, and proportionably for a greater; and if any *Sheet* or *Sheets* shall crack, or any wise prove defective in respect of the *Lead* it self, they will be obliged



at their own Charge (Carriage only paid for) to lay new Sheets in their room, without that patching and botching with Solder that appears upon all the *Cast-lead Coverings* in Town, that have not lain half so long, at a very great Charge in *Work* and *Solder*, besides the Damage the House must have sustained thereby.

☞ But because some Plumbers, and others their Friends, do pretend greater Care and Improvement in their Casting of late, and have offered to lay Wagers that they can Cast a Sheet of their full length equal within one pound in ten quire through; Mr. Hale, a Partner and Manager of the Work, is ready to take any such Wager; nay, he will give them a pound and an half in ten, and lay them the price of a Fodder of Lead, that all the Plumbers in Town, and their Friends joyned to their assistance, in the way they have hitherto used of Casting upon Sand, they cannot do; and is ready to enter into fair Articles with any one that shall make the Wager; though if some should be found so dexterous as to cast one or two such Sheets perhaps in half a dozen, it would not mend the matter for general use: Moreover, if this could be done, even at the rate of a pound and an half in ten, Mill'd-Lead is yet cheaper about Three per Cent. For Ten hundred weight of Cast lead would cost 7 l. and Eight hundred and an half of Mill'd Lead but 6 l. 16. s. As to the Plumbers pretence of Casting broader, that's not yet (according to the Proverb) as Broad as Long; for the Mill'd Lead size of Three Foot and an half being broad enough, and perhaps better than broader for general use, and they able to make their Sheets above  
twice



twice as long as the Plumber can cast, if need require, to save Drips, and comply with the length of Coverings, this disadvantage is not made good by any pretence of breadth soever; which if greater breadths are necessary, as for Coperas-works, &c. may be supplied with Mill'd Lead, by burning a Seam joyning two Sheets together.

This Mill'd Lead being to be had of any Thickness, even from one pound in the Foot to twenty, or more if desired, must for the Reasons aforesaid be cheaper and better than Cast Lead, and will serve for all uses that Cast Sheets are fit for, and the thinner sorts for many more, any one may be supplied with able Workmen to lay the same on Churches or other Buildings, or work it into Cisterns, Fountains, Pipes, Vessels for Brewers, Dyers, Coperas-works, Dairies, &c. and Solder at 6 d. a pound; also where Nailing is required there sheathing Nails, made of a Metall that will not rust, corrode or decay the Lead, as Iron does, may be had for 8 d.

a Hundred, at the Mill'd-Lead-Shop, \* the Sign of the Mallard on the West-side of Fleet-Channel, near Holborn-bridge, or by a Note left for Mr. Hale at the Temple Coffee-house, that he may know where to speak with the Parties, or send his Plumber to undertake their Work.

There's nothing said herein relating to the Mill'd-Lead-Sheathing; that having been discontinued in the Navy (after about twenty Ships sheathed) requiring a more large and particular Account what may

\* The Mill'd-Lead-Shop is since removed to the Mill'd-Lead-sign in Orange-street by Red-Lyon-Square, near Holborn, where Mr. Hale himself also now lives.

*have been the Cause thereof, the Objections, Answers, Proofs, and whole Proceedings in that matter, are intended shortly to be Printed, which will sufficiently satisfy the unprejudiced, and justify the preference of Lead-sheathing before that of Wood in many particulars, besides Cheapness; which with regard to its Duration, and the Value of the old Sheathing when stript, will save the Owner above Cent. per Cent. And all the noise that has been about the Rudder-Irons decay, charged on that Sheathing, proved to be frivolous, vain and groundless.*

All Merchants or others that shall buy any considerable quantity, above a Tun at least, upon discourse with the said Mr. Hale, may have some Abatement even from the present Prices, suitable to the quantity and payment.

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LONDON, Printed for T. H. and are to be had at Garraway's Coffee-house, the Temple Coffee-House, and the Mill'd-Lead Shop above-mentioned. 1690.

Notwith-

Notwithstanding which, the Plumbers (to prevent a Contract with the Commissioners of the Navy, for which this Company had then a Proposal lying before them to furnish their Mill'd-Lead of all sizes of thickness and thinness, as well for Sheet-Lead as Scuppers, &c. into their Majesty's Yards) gave in to them the Paper following: The Vanity and Falshood of which Paper will plainly appear to the Reader from the *Testimonies* given even by the Owners or Inhabitants themselves of those Houses from whence they raise their Instances of commending their *Cast* and decrying the *Mill'd-Lead*, divers of which are here also Printed at the Foot of their said Paper, others being Houses never covered with Mill'd-Lead at all, as the Lord *Preston's*, or with Mill'd-Lead, as the Lord *Crew's*, against which no ground for complaint of the Lead, in which Houses Servant-women only living, they could not give proper Certificates herein.

THE  
Plumber's Propofal  
TO THE  
NAVY-BOARD.

*Right Honourable,*

**U**nderstanding that the Persons concerned in the Mill'd-Lead have put out Printed Papers in Vindication of the Service of the said Lead, and have also lately made Propofals to your Honours to serve their Majesty's therewith, or any private Persons for Covering of Houfes, Gutters, Pipes, Cisterns, Scuppers, Liquor-Backs, or such like Work, which they pretend will be cheaper and better than Cast-Lead :

*May it please your Honours,*

**T**He Mill'd Lead is no ways so serviceable and cheap as the same is represented, nor indeed scarce fit for any service, as is evidently proved by daily experience in most places where the same has been used ; that as-  
ter

'ter it hath lain a few Years, it hath crack'd,  
 'flaw'd, and rose in ridges, so that the Persons  
 'concerned, after having been at a considerable  
 'Charge in the daily patching and mending of  
 'it, have at last been forced to take it up, and  
 'lay Cast-lead in the room of it, before such  
 'time as the Houses or Places could be made  
 'tight: of the truth of which, several Examples  
 'can be given your Honours upon Oath, if re-  
 'quired.

'That on the other side, the Cast-Lead doth  
 'plainly make appear its durance and service,  
 'for in several old Buildings about this City  
 'and *Westminster*, where this Lead hath been  
 'laid for a great term of years, yet remaineth  
 'as firm and right as when first laid: And be-  
 'sides, the same is cheaper and better to their  
 'Majesty, or any private person, by 20 *l. per*  
 '*Cent.* than the Mill'd-Lead is, according to  
 'the Rates it is now sold, which together  
 'with the strength and service is very confi-  
 'derable.

'Also the Solder made and used by them of  
 'the Mill'd Lead, is not fit for service, whereas  
 'all Solder used by the Plumbers is by Essay  
 'sealed according to the standing Rules of the  
 'Company.

'By what is here offered, is humbly desired  
 'may be taken by your Honours, as proceeding  
 'from Duty, and not in prejudice to the Per-  
 'sons concerned in the Mill'd-Lead, for not-  
 'withstanding the plausible pretences of the use-  
 'fulness and service of the said Lead, and the  
 'disparagement of the Cast-Lead, yet the  
 'Plumbers have not made any like returns to

‘ discredit the Mill’d-Lead, not for want of rea-  
 ‘ sons, but being assured that a short time would  
 ‘ sufficiently make appear the service and firm-  
 ‘ ness of the Cast-Lead, and the sleightness and  
 ‘ the charge of the other, which is now suffici-  
 ‘ ently evidenced, and is humbly submitted to  
 ‘ your Honours Considerations.

*Places where the Mill’d-Lead hath  
 been used.*

His Majesty’s Horse-guard Houses at *White-  
 Hall.*

The Lord *Preston’s* House.

The Countess of *Portland’s*.

The Lord *Crew’s* in *Soho-square*.

Mr. *Fox’s* in *Arundel-street*.

\* No such  
 House to be  
 found.

\* Mr. *Harris’s* in *Norfolk-street*.

Sir *John James’s* in *Pell-Mell*.

Dr. *Chamberlain’s* in *Essex-buildings*.

Esq; *Sanders* at *Tooting*.

Sir *Ant. Deane’s*.

These and several others which have been  
 covered with Mill’d-Lead, have been taken up  
 and laid with Cast-Lead in a very short time,  
 as may be made appear.

Ex. per W. Dale,  
 23 Aug. 1690.

COPIES

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C O P I E S  
O F  
Letters and Certificates,  
Proving  
The *Plumber's* foregoing Paper  
TO BE  
Scandalous and False.

---

*Mr. Saunders's Letter.*

Mr. *Hale*,

‘ I Have thought upon the Paper you shew-  
 ‘ ed me, which you said the Plumbers pre-  
 ‘ sented to the Navy-Board, complaining of  
 ‘ mighty defects in your Mill’d-Lead, and men-  
 ‘ tioning a great many places where they say  
 ‘ they have been forced to strip it off, and new  
 ‘ cover with their Cast-Lead, and amongst the  
 ‘ rest my House at *Tooting* : I wonder much at  
 F 5 ‘ their

' their Confidence and Folly, to say such things  
 ' that may be so easily contradicted : I assure  
 ' you my Covering at *Tooting* lyes very well,  
 ' and I do not doubt but it will so continue ;  
 ' indeed I am very proud of it, and I do not  
 ' think there's a finer and better Covering in  
 ' *England*, at least not of Cast-Lead, for I  
 ' have Sheets thereon about twice as long as  
 ' I ever heard the Plumber pretended to Cast,  
 ' being 34 Foot long, and I was very well sa-  
 ' tisfied after a great deal of Discourse with  
 ' the Plumber before I began, that your Mill d  
 ' Lead was cheaper in the whole Work, and  
 ' would prove much better, and being exactly  
 ' equal ( which theirs is far from ) would last  
 ' longer than theirs, and I see no cause yet to  
 ' alter my Opinion. Upon your request to  
 ' have something from me in Writing on this  
 ' Occasion, I could say no less, and suppose  
 ' this may suffice from

28 Aug. 1690.

S I R,

Your Humble Servant,

Robert Sanders.

Dr.



## Dr. Chamberlain's Letter.

Mr. Hale,

‘ **W**hen I last saw you, you shewed me a  
 ‘ Paper address’d by the Plumbers to  
 ‘ the Navy-Board, wonderfully decrying your  
 ‘ Milld-Lead, commending their own, and be-  
 ‘ cause that amongst several other places, which  
 ‘ they say were covered with Mill’d-Lead, that  
 ‘ in a short time ( being very defective ) were  
 ‘ taken up, and new laid with Cast-Lead, they  
 ‘ mention mine in *Essex-Buildings* to have been  
 ‘ one ; you then desired me to give two or  
 ‘ three lines in Writing of the truth thereof,  
 ‘ which I could not reasonably deny you ; and  
 ‘ I do here assure you that the same Mill’d-  
 ‘ Lead which was first laid on about twelve  
 ‘ Years since upon two Platforms at my House  
 ‘ there, remains on still very well, free from  
 ‘ any such cracks or flaws and ridges they  
 ‘ complain of, which I have reason to believe  
 ‘ would not have continued so well, if they  
 ‘ had been covered with Cast-Lead ; for that  
 ‘ the Cast-sheets which were laid upon the  
 ‘ Cornish next the Street before I came to the  
 ‘ House, were afterward in many places so  
 ‘ crack’d and cockled, that about eight Years  
 ‘ ago, as I remember, the Plumber took it up,  
 ‘ or great part of it, and new laid it again : I  
 ‘ considered also of the Charge of both wayes,  
 ‘ before I made use of the Mill’d-Lead, and was  
 ‘ then

‘ then satisfied that the whole was cheaper to  
 ‘ me, and would prove better than if I had  
 ‘ laid it with Cast-Lead of the size the Plumber  
 ‘ proposed, and I continue of the same mind  
 ‘ still ; all which I thought fit to lay upon this  
 ‘ occasion, and leave it to you to make use  
 ‘ thereof as you please, and am

26 Aug. 1690.

S I R,

*Your Humble Servant,*

Hugh Chamberlain.

*Mr. Hoy's Letter about Mr.  
 Fox's Lead-Covering.*

*Mr. Hale,*

‘ A Ccording to your desire I waited upon  
 ‘ my Friend Mr. Fox, and acquainted him  
 ‘ that the Plumbers in a Memorial by them  
 ‘ presented to the Navy-Board, had alleadged  
 ‘ that several Houses ( amongst which his House  
 ‘ in *Surry-street* was mentioned to be one ) for-  
 ‘ merly covered with Mill'd-Lead, had been  
 ‘ since strip'd and covered with Cast-Lead ; and  
 ‘ desiring to know the truth of it, he did assure  
 ‘ me that their Allegation was absolutely false,  
 ‘ for that the Mill'd-Lead formerly laid on by  
 ‘ you, still remains there not stirred, which he  
 ‘ would

‘ would have shewn me, but was then a little  
 ‘ indisposed, being but newly return’d from  
 ‘ *Tunbridge* ; and the access to it being by an  
 ‘ Engine, which would have required his Com-  
 ‘ pany, I was unwilling to trouble him, but  
 ‘ will wait upon him again whenever you  
 ‘ desire :

*Sept. 1. 1690.*

S I R,

*Your Servant,*

Clement Hoy.

## *Mr. Letchmere's Letter.*

*Mr. Hale,*

‘ **Y**OU shewed me a Paper which the Plum-  
 ‘ bers gave in to the Navy-Board, where-  
 ‘ in they much complain of the defects of the  
 ‘ Mill’d-Lead ( boasting of the excellency and  
 ‘ durableness of their Cast-Lead ) and say, that  
 ‘ where the Mill’d-Lead has lain a few Years,  
 ‘ it hath so crack’d, flaw’d, and rose in ridges,  
 ‘ that after the Owners have been at great  
 ‘ Charge in the daily patching and mending of  
 ‘ it, they have at last been forced to take it  
 ‘ up, and lay Cast-Lead in its room : But I  
 ‘ doubt these Plumbers mistake the one for the  
 ‘ other, for I know very well their Cast-Lead  
 ‘ had all these ill qualities they complain of ;  
 ‘ for

' for upon a House of mine, where Mr. Clark  
 ' now lives, next Door to the Bell in Fryday-  
 ' street, which was covered with Cast-Lead at  
 ' the first Building after the Fire : I do aver  
 ' that after such rising and cockling, and its  
 ' being patch'd almost all over, about eight  
 ' Years since the Tenant was forc'd to strip  
 ' it, and new lay it ; and I well remember I  
 ' allowed 10 l. towards the charge, and I fear  
 ' in a few Years it will be in as bad a Condi-  
 ' tion as ever, for it is already patch'd in di-  
 ' vers places ; and had I had the good Fortune  
 ' to have known time enough of your Mill'd-  
 ' Lead, I am very well satisfied from my own  
 ' Observation of such Places where I have since  
 ' known it laid, and the reason of the thing  
 ' it self, and the charge thereof ( a Man  
 ' paying for no superfluous Lead, as in the  
 ' other you do ) that I might have saved  
 ' Money, and have had a far better and more  
 ' durable Covering on my House than now I  
 ' have.

' SIR, I am so well satisfied of the excellen-  
 ' cy of your Mill'd-Lead, and of the greatness  
 ' of its worth for all uses beyond Cast ( which  
 ' is notwithstanding all the Care that can be  
 ' used in the Casting of it full of great uneven-  
 ' ness and other defects ) that I could say much  
 ' more than I have on this Subject, but I al-  
 ' ways thought it a very impertinent thing to  
 ' spend too much time in arguing against Tran-  
 ' substantiation, it being maintained by the im-  
 ' pudence of a Party that resolve they will not  
 ' be convinc'd, and I take the only reason why  
 ' the Plumbers oppose your Mill'd-Lead to be  
 ' this,

this, because their Interest is concerned, and I think they are as much in the right in so doing as those Persons are in the wrong, that make use of their Cast-Lead when the other may be had.

27 Aug. 1690.

SIR,

Your Humble Servant,

Tho. Lechmere.

## Mr. Lightfoot, the Lady Portland's Steward's Certificate.

**W**Hereas Mr. Hale did this day shew me a Paper from the Company of Plumbers, directed to the Honourable Commissioners of the Navy, whererein they had preferred Cast-Lead far before Mill'd-Lead, and withall had there inserted several Persons of Quality and others, among whom was my Lady, the Countess of Portland's Name; that her House had formerly been covered with Mill'd-Lead, and since with Cast-Lead: Now these are to Certifie, that my Lady, the Countess of Portland's House neither was nor is covered with Mill'd-Lead, but upon altering the form of the Building, and making some additions thereto about Eleven Years since, she covered the back part with Cast-Lead, which still remains, but not without yearly repairing, of late occasioned by cockling  
and

and rising of the Lead into a ridge, which afterwards cracks, and so are obliged to patch it with Soldar, as in several Places we have since 'twas laid on. As Witness my Hand this 30th. day of August. 1690.

Robert Lightfoot.

### Mr. Martin's Letter.

' **Y**OU told me that some Plumber had lately informed the Navy-Board that the ' Mill'd-Lead Covering upon a House of mine ' in Rood-lane was very much cockled and ' crack'd, and that they had taken off some ' part of it, and laid Cast-Lead in its room; of ' the truth of which, you desiring a line or ' two from me in Writing: I do assure you 'tis ' no such thing, for the same Mill'd-Lead sheets, ' near 30 Foot long, that was first laid on ' about eleven Years agoe, lyes very well still, ' without any ground or cause for such Complaint; and I am so well satisfied with it, ' that if I had the like, or any other Occasion ' for Sheet-Lead, I should preferr the use of ' your Mill'd-Lead much before that which is ' only Cast.

Josh. Martin.

Sept. 15. 1690.

As

As to the Plumbers Skill and Conscience they pretend about their Solder, notwithstanding their hard Words and hard Mettal they usually talk of therein to make it a Mystery ; all that are any wise conversant in Mettals know, that their Solder is only a Composition of Lead and Tyn in such proportions that the same never stands them in above fourpence-half-penny a Pound, and therefore well may be afforded at their highest Essay for six pence, so that the Mill'd-Lead Company are under no Temptation of making it courser than they ; which however would be no damage to the Customer, but an injury to themselves that work it, a due proportion of Tin being only necessary to make their Solder work and run the better before their Iron.

*The Mill'd-Lead Company after their new Proposal to the Navy-Board, presented also the Memorial following, to shew the preference of their Mill'd-Lead for Scuppers, &c.*

To

To the Right Honourable,  
The Principal  
Officers and Commissioners  
Of their  
MAJESTIES NAVY.  
MEMORIAL,

*Humbly offered by the Mill'd-Lead  
Company, proving that their  
Mill'd-Lead Scuppers are better  
than Cast-Lead, and at least  
25 per Cent. cheaper.*

**T**His Company having in *January, 1678.* made  
a Proposal to this Board to make their Scup-  
pers of Mill'd-Lead, one Mr. *Parsons* a Plumber  
they then usually employed, opposed it ; pre-  
tending, that altho their Lead was not exactly  
equal, yet the inequality was so inconsiderable,  
that Mill'd-Lead Scuppers being then 4 s. in a  
hundred more than theirs, they would be much  
dearer to the King ; whereupon the Board was  
pleased



pleased to appoint a time for hearing both sides; when the Plumber to make his Pretences good, undertook his Scuppers should not be above half a pound in ten heavier than the size the Board should Order; they thereupon, 7 Jan. 1678. ordered each to make 36 Scuppers of three several sizes and thicknesses, viz. 8 l. 10 l. and 12 l. to the Foot square; both sides soon after sent in their Scuppers to Deptford, where being received into the Stores and weighed, the Mill'd-Lead Scuppers appeared to be conformable to the Order, and to weigh but 8 c. 1 q. 26 l. whereas the Cast-Lead Scuppers weighed 12 c. 3 q. 10 l. above one third more; which appearing so gross a difference from what the Plumber undertook, and he pretending Excuses and Servants carelessness:

The Board indulged him another Tryal upon 72 Scuppers, when he took to his Assistance one Mr. *Whitehall*, another Plumber that usually also made Scuppers for the Navy, and it cannot be imagined but that these Plumbers now used all their Skill and Care, which notwithstanding all, though in many places they appeared to be thinner than the Milled-Lead of the sizes given, the weight of the whole 72 came to 25 c. 1 q. 12 l. whereof *Parsons* made 31, weighing 9 c. 3 q. 0 l. and *Whitehall* 41, weighing 15 c. 2 q. 12 l. whereas the 72 Mill'd-Lead Scuppers weighed but 16 c. 3 q. 10 l. about the same proportion the former were, which at the then Prizes of 22 s. for the Cast, and 26 s. per hund. for the Mill'd-Lead Scuppers, was 27 per Cent. loss to the King; after which the Company made many.

ny more ; however Demands have been discontinued since. This being a matter of Fact, the truth of which may appear from the Store-keepers Books at *Deptford*, this Company hopes when you shall thus be put in mind of the great and certain loss their Majesties have and must sustain in this particular, demonstrated by Tryals that have been so fairly and fully made, your Honours will make no great difficulty of restoring this part of their Work at least to their Service.

May 19. 1690.

*All which they humbly lay before this Honourable Board, for their Consideration upon the New Contract proposed.*

After all ( and upon the *Surveyors* producing to the Board a piece of Lead indifferently cut out of a Cast-Sheet of 8 l. in the Foot square, one with another, in *Deptford-Yard*, which they owned to be not above 6 in some places ) they thought fit in *Septemb.* 1690. to Contract with the Company to supply their Majesties Yards with their Mill'd Sheet-Lead, of all sizes, of thickness and thinness, at Rates agreed ; but as to the Scuppers, they were pleased to suspend any Contract for them, 'till they should upon a further Tryal ( shortly to be made ) be satisfied that they also were better for their Majesties Service than Scuppers made of Cast-Lead, saying they had had no account of the Success of the former Tryals.

A

## T R E A T I S E

O F

## Naval Philosophy.

In Three Parts.

- I. *A Phisico-Mathematical Discourse of Ships and Sailing.*
- II. *Of Naval Policy.*
- III. *Of Naval Oeconomy or Husbandry.*

The First Part,

*Contains the several Sorts and Closes of Experiments under-mentioned, viz.*

1. **T**HE specific weight of *Water*, and *Timber*, and *Irons*, as also the several Materials whereof *Shipping* is composed.
2. The absolute and comparative strength

of

of *Wood, Metals, and Rates*, in their several dimensions, Figures and Quantities, and how much the *strength* of the same is diminished by Notches, Holes, and other Excavations, or increased by the Texture and grain of the said materials.

3. The *motions, strength, and matter* of the Wind.

4. The *motion, strength, course, and figure* of Waters, upon the surface thereof in *Rivers, Tide-ways, Currants, and Edies*; as also in the Ocean, whether the same be spontaneous, or by agitation of the Wind.

5. Of the *Tractive and Pulsive* forces upon swimming Bodies, in respect of *strength, time, proportional increase of swiftness, lines of Direction, Superficies of Resistance, Magnitude of the movent bodies, and impression of force* in various *Angles of Incidence and Reflection*.

6. Several *Hydrostatical Experiments* relating to *Pumps, and Leakage*, according to several parts of the Ship, and depth under water, wherein the same may happen.

7. Experiment of *spinning, twisting and wearing*, with reference to *Sail-Cloath, Cables, and all other sorts of Cordage*.

8. Experiments upon *Pitch, Tarr, Rosin, Oyl, Brimstone, Tallow, Ocum-Leather, &c.* relating to the *Sheathing, Caulking, and preserving* of Vessels, and their appurtenances from the injuries of *water, weather, worms and weeds*, and of their *weight, Extention, Duration, &c.*

9. Of the choice *seasoning and preparing* of *Timber and Plank, Knees, and Trenails*, as also of *Iron, Hemp, and other Materials* used in Shipping.

10. Of

10. Of the particular power of *Oars, Wheels, Poles, draught of men, and Horses*, with reference to their Actions upon Vessels, and of reducing them all to one and the same Calculation and Principal.

11. Of *sounding* and measuring the depth of water, and of discovering the Nature of *Ground* as to the *hold-fast of Anchors*, wear and tear of *Ground-Tackle*, with what else belongs to the artificial moving and riding of Ships upon all occasions.

12. *Magnetical, Hoxometrical, and Optical Instruments and Experiments.*

13. *Nautical Geography and Astronomy.*

14. *Nautical Staticks, and Mechanicks*, relating to *Pullies and Crows, Handspecks, Screws, Hances, Kildwedges, Nippets, Capsterns, Windlasses, Slings, &c.* in order to the *Landing, Mastng, Leading, Careening, and weighing up of a Ship.*

15. Of *Gun-powder*, the several sorts of *Metals* for *Guns and Shot*; their several figures and proportions, in order to the several Effects of *Penetration, battering and direct shooting.*

16. Of several Observations upon *loading of a Ship with Lead, Wood, Cotton, Liquor in Cask, Corn, Salt, Frail and Timber*: And the Accidents which usually fall out in each of the said sorts of loading, with reference to the safety and well sailing of a Vessel.

The said *first part* containing also the *Definition and division* of a Ship in its several parts, together with a *Selection and Description* of the

the principal things and notions which are to be considered in *framing* and *fitting* of a Ship for the several uses unto which the same is designed, in manner following.

1. A Ship is understood to be all from the *Keel* to the *Vane*, and from the extremity of the *Boulsprit* to the *Lanthorn*.

2. The said Ship is divided into *Hull*, *Sails*, and her *Burthen*.

3. The *Hull* is considered but as one piece of Timber, and carved out of one Logg, and is divided into what is under the *upper Deck*, out of which all waters is to be excluded. And what is above the same, as *Cabins*, *Round-house*, *Cud-die*, *Fore-castle*, *Coaches*, &c. which may be rather esteemed as part of the burthen of a Ship, than *Essential part* of the same.

4. The *Hull* under the said *upper Deck* is divided into the *Cavity* or *Hold*, whether the same shall be subdivided by other *Decks* and *Bulk-heads* or not, as also into the *Shell* of the said *Cavity*: and thereby into the *Additaments* affixed to the outside of the said *Shell*. Such are the *false Stern*, *Gripe*, *Keel*, *Stern-post*, and *Dead-rising* up the *Tuck*, excluding the *Rudder*.

5. Upon the *Shell* of the Ship, or rather of the said *Cavity*, there are to be considered the several *Lines* under-mentioned, to be drawn *parallel* to the *Keel*, (*viz.*)

1. The *line* unto which the *Hull* of the Ship sinks upon her *launching*.

2. The *line* unto which the whole Ship sinks when she is *rigged*, *ballasted*, and fitted for the best

best advantage of sailing, and mann'd with a sufficient Complement for that purpose, victualled with three months Victuals, and furnish'd with Defensive Arms.

3. The line unto which she sinks loaden as a Merchant Man.

4. The line unto which she stoops upon a Wind of either side.

5. The line of Horizontal-section where the Gun Deck, and all other Decks and Orlop ought to be placed, and the lines to which the Ports between each Deck ought to be made.

In the next place is to be considered the three perpendicular length-way sections following, viz.

1. The section of splitting the whole Ship, Cabin, and all other superstructures included between the Plank-sheering, and the Keels, the upper line of which section is called the Sheer of the Ship.

2. Upon the general and most comprehensive section I propound, that all the Horizontal lines before mentioned may be mark'd together with the bottom line of the Interval Cavity or Hold before mentioned.

Lastly, let there be a transverse section of the Hull at the main bend, within which let two other parallel sections be described arising from each extremity of the Keel.

Next to the several Lines and Sections before mentioned, it will be necessary to take Notice of the Center of Gravity and Magnitude, as well of the whole Ship comprehended between the Keel and the Vane, as of the several parts thereof, viz. The Centers of Gravity and Magnitude of

of that part which is under the water ; as also of that which is above the water in the Air and Wind.

2. The same also to be observed when the Ship swims upon an *uneven* and *unlevel* Keel drooping forwards, or sending aft.

3. Consideration is to be had of that *line* which by a *Spindle* passing and fixed into the Ground, the Ship lying cross a Current when no Wind at all is stirring, would be in *Equilibrio* ; also the like *line* passing through the supernatant part of the Ship would also be in *Equilibrio*, its broad side lying to the Wind in dead water.

In the next place there ought to be considered the proportion between *the way* of the Ship cut off at its greatest *transverse section*, and *the way* of the same shaped from the same section forward in the usual manner, or to his best advantage.

2. The proportion between the *resistance*, between the perpendicular *length-way section*, and outside of the Hull shaped as is usual.

3. Between the *Horizontal Section* at the *water line*, and the *bottom* of a Ship in its usual shape.

## CH A P. II.

BEING thus furnished with the sixteen sorts of *Experiments* above mentioned, and with the clear and definite understanding of the *several parts* of the Ship, and of all the *several Sections, Lines, Centers, and Proportions of resistance* above mentioned : We then proceed upon the  
third



third Branch of the first *General Part* as followeth. (*viz.*) Suppose we have before us a piece of *Timber*, of equal substance, of an indefinite length, and square at both ends, we are now to consider by what process to carve out of the same the *Hull* of a Ship, which work will contain the several Considerations following.

(1.) Of what *length* to cut the said *Timber*, which at first we will suppose to be the *length* of *four sides* of the square, intending hereafter to debate whether the same ought at all to be longer or shorter, and in what *Cases*.

(2.) Suppose the said *Square* be divided into *twelve parts*, and that seven of them shall be under water when the Ship is loaden.

(3.) Dividing the *length line* into twelve parts, and at three of them let the two *sides* converge into an *Angle*, whose sides let be *portions of Circles* unto which the remaining strait part may be a *contingent line*, which Angle is the first means of facilitating the *Ships way* through the Water.

(4.) At four parts let the *bottom superficies* converge into an Angle, with the *Horizontal Section* above mentioned, *viz.* at the Ships greatest draught of water.

(5.) At the said Section let the sides downwards converge into an Angle, consisting also of *Circular Lines*. This last Angle is made for the Ships ease of falling into the Sea, as the two first were for its easier passing through it.

In the next place we must provide for the coming of water to the Rudder, which is to be performed by two other Angulations, *viz.*

from fifteen *parts aft*, let the *sides* of the Ship converge into an Angle from the *Horizontal section downwards*, where the Ship draweth least water at her Launching, which will be the *height of the Tuck*, let the *bottom superficies* be bent in a *Circular line*. And thus we have in gross set down the *five Incurvations* of the bottom and sides of our Logg, and how the *butt-ends* thereof have been as it were abolished forward on for the *ease* passage of the Vessel through the water, and aft for the quick and effectual pulse of the water upon the *Rudder*.

In the next place we come to the like shaping of the remaining part of the Logg, which we intend shall swim above the water, which is performed as followeth.

Let it be supposed that the Ship upon a Wind, is to stoop upon a certain Angle, let the supernatant sides of a Ship so much *tumble* (as they call it) as that the said *sides* may remain *perpendicular* when the Ship *stoops*, which being done quite round the upper surface, the remainder will be the *shape and section* of the *upper Deck*.

*Memorandum*, That all the forementioned Incurvations are to be trimmed and repaired by reconciled lines.

In the next place we come to *hollowing or excavating* of our Logg, which suppose (beginning at the *middle*) we do (leaving equal thickness) every where until the Logg become so light that it swims at the line representing the *launching line*, and consequently we have now acquired the *model of a Ship* as it appeareth in her launching, except the *Cabbins* and  
what

what is usually superstructed upon the upper Deck.

In the next place we are to consider how far *ballast* and *weight of rigging*, &c. will sink the said Ship : And secondly, how much *deep* the weight that must be added to fit out a *Man of War* will depress her, for till then we cannot rationally determine the place of the *Gun-deck*, wherefore the next enquiry must be, what *extent of Sail* our Vessel must carry, and consequently the *length of the Masts* and *Yards*, and then of their *thickness* and *weight*; and from thence the size of the *rigging*, and from thence the *Wind-lost*, and from thence the *Cables* and *Anchors*, and from thence all the *Capsterns* and *Windless Boats*, *Bitts*, *Cathreads* and *Davits*.

In the next place we are to consider the *quality*, *quantity* and *weight* of our *ballast*, so as the Ship may stoop but according to our intention, and according to the *strength* of our *Masts* and *Shrouds*.

Having thus found out our second Water-line, which I call the *sailing-line*, as the *first* was called the *launching-line* : Now we come to the *third* which is the *line of War*. And this is to be discovered by computing the *weight* first of the *Ordnance*, which suppose to be in a *Man of War*, one *6th*. part of what is between the *Sailing-line*, and the *line of Burthen*, or *fourth Line*. Secondly, the *weight* of *Men* with three months *Victuals* ; in order thereunto we must determine the number of *Men* for *sailing* from the *Spread of Canvas*, and the number of *Men* for *fighting* from the *Amplitude* of the *Deck*, and *weight* of the *Ordnance*.

Having found out the said Line, and considered the *distance* of *Trunnions* of the *Guns* from the *Gun-deck*, and the *distance* of the *Muzzels* of the *Guns* levelled from the surface of the water, we come at length to determine the place of the *Gun-deck*, and consequently of the other *Deck*.

*Memorandum*, That the *superstructions* upon the upper Deck are not only for the *Accommodation* of *Men*, but also *fortifications* of the Ship ; forasmuch as the *Guns* in the

*Fore-castle* and *Steerage* clear the *Deck*, as those of the *Round-house* do the *Quartern deck*.

Having found the *dimensions* of the *Masts*, we next come to the *place* of them, *viz.* by what points of the *Gun-deck* they must pass, and here we must consider the reasons of their *raking ast*, as also of the *steering* of the *Boulsprit*, and withal the reasons of placing the *Top-mast* before or behind the *Main-mast*, and of dividing each *Mast* into three parts, and the *proportion* of the *round Tops*, *main Stays*, the *place* and *fitting* of the *Shrowd* so as to make way for the *gibbing* of the *Yards*, and setting of the *Shrowds loose* or *tort* as the *Condition* of *Sailing* of the *Vessel* requires.

### CH A P. III.

1. **T**He reason of *Ships* going against the *Wind*, and in what proportion she maketh way between her being *right afore the wind*, and lying within five points of the *wind*.

2. The whole *Doctrine* of *Steering* and *Rudders*.
3. The whole doctrine of *Mooring* and *Anchors*.
4. Of the *Lee-boards*, their use, dimension and place.
5. What *Sails*, *Masts*, *Yards*, and *Rigging* is fittest for every size and sorts of *Vessels*, according to the *Seas* and *service* whereunto it is to be applied.

6. Of the *Shape*, *Cutting*, *Sowing*, and *Setting in* of *Sails* into the *Headropes* and *Boltropes*; of the several *substance* and *thickness* of *Sails*, and of the *Effect* and *Welling* them, *Easing* of *Shrowds*, *Looseness* of *Masts*, and upper *Masts*.

7. Of the *Effects* of true *Trim*, shutting up the *Ports*, general *Quietness*, firing of *Stern-pieces*, and the best course upon a *Chase*.

8. How *Top-sails*, *Stooping*, *Weather*, or *Leeward Helm*; as also how the *Keel*, *Gripe*, and *Mizen Sail*, may be fitted

fitted to *promote* or *hinder* the *Sailing* upon occasion.

9. What makes a Ship Roll and *laboursome* in the Sea ; what makes her *wear* and *stay* well ; and what makes her ride *hard* or *easie* at an *Anchor* : what makes her *pitch* and *scend* too much : what makes her *fall easie* or *hard* into the Sea ; what makes her *Leeward* or *keep a good Wind*.

10. Of the just *proportion* of *Sails* with *more* or *less*, that which will make the Ship go *worse* ; of *Equations* between the *spread* of *Sails*, and the *Velocity* of the *Wind* : Of the utmost *Velocity* of a Ship with *Wind* and *Tide* : Of the *proportion* of the *counter-resistance* of *winds* or *tides* ; why some Ships sail better with *much*, and some with *less* proportionably.

11. How to compute the *Impediment* which *Foulness* and *Weeds* do make in a Ships way, and in what *proportion* *Smoothness*, *Sope* and *Tallow* doth *quicken* it.

12. How a Ship is to be fitted with *Decks*, to beat it up to windward in foul weather, why the *Fore-sail* must be *less* than the *Main-sail*.

## CHAP. IV.

WE have hitherto supposed the *Ship* to be exactly shaped inside and outside out of one simple *Logg* of *Wood*, which being impossible to do otherwise in Speculation, it is necessary to come at length to the practical part of *Ship-Carpentry*, which is the Art of imitating the model afore-mentioned, and of composing a Ship, not out of one but several thousand pieces of *Wood* and *Iron* : Wherefore this Chapter shall comprehend as followeth.

1. The History of the *Practice* of the best *Shipwrights* in *England*, *Holland*, and *Portugal*, in their building *Ships* as aforesaid.

2. Sup-

2. Supposing that a Ship commonly reckoned 150 Tun, be a *fit size* to sail in round the World: And that the just strength of every part of the same were certainly known and determined, 'tis desired to know. of what size and scantling *each correspondent* Timber must be of, to make a *greater or lesser* Vessel of equal strength, and to compute the *difference* of strength between *greater and smaller* Vessels of the common Built.

3. How to make practical *Equations* between the strength of *Timber and Irons*, and between *Trenails and Bolts*, &c.

4. Out of what *Data* arises the knowledge of the strength of *Knees, Bolts and Nails*.

5. That vast Ships of 1500 Tuns, do require a *different* way of *Carpentry of Masts and Yards* than what is used, and particularly in no Case a Mast above 30 inches *through* and above  $\frac{3}{4}$  the present *length*, is requisite.

## CHAP. V.

1. **W**Hat *Alterations* in Shipping, the use of the *Compass* and *Guns* have produced, and consequently how to conjecture what was the Shipping of the *Ancients* in these Countreys.

2. How the *difference of the Materials* for Building, the difference of *Trades and Commodities*, and the differences of *defensive and offensive Warfare*, doth occasion differences of *Shipping* in the several parts of the present World.

3. The History of the *Improvement* of Shipping, sailing upon a Wind, and *Advance* of the Shipping Trade for the last Twenty years, by the *Portugals, Genoveses, English, Netherlands*, and the inhabitants of *Baltick*.

4. A Description of several Attempts which have been made

made these last twenty years for the improvement of Shipping, with the respective *success* and *Sailers* of each.

## The SECOND PART,

Being of

# NAVAL POLICY.

## CHAP. I.

**T**Hat the King of England, being not only by Right and Custom *Sovereign* of the *Narrow Seas*, but having also the best Means and most Concernment to be more considerable at Sea, than any other *Prince* or *State*; it is therefore his *Interest* to know and discover as followeth.

1. How many *Tunn* of *Shipping* there be in the whole *Comercial* World, from 15 to 1500 *Tunns*, as are able to cross the Seas, and how many Ships there be of each Century of times, with the said 15 Centuries.

2. How many *Ordnance* belong to them, and of what weight.

3. How many *Seamen* there are in all, and particularly of such as have served three years at Sea.

4. To have *Lists* of all the Ships and *Seamen* belonging to any *Ports* or places within his own Dominions; and a ready Method to know where they are at all times, at home, or at Sea.

5. What *Harbours* and *Ports* there are in the whole *Comercial* World; unto which *Shipping* does belong, and what Ships



Ships they are able to receive, what are the special *advantages* and *Inconveniences* of each.

6. What is the *Wages* and *Rate of Victuals* for *Seamen* in each *state*.

7. To have intelligence of all *Privateers*, *Pickeroons*, and *Pirates* which are *abroad* at all times, and in a forwardness to go forth.

From hence only his *Majesty* can know how to proportion his *Navy*, (that is to say) his *Navy* cannot or need not consist of *more Tunns* of Shipping than are *Seamen* of his *Subjects*, and *one quarter* more ; I say, *greater* it cannot well be, and it need not be much *bigger* than of *so many Tunns* of Shipping ; than any two of his *Neighbour States* have *Man to Man* with preservation of their *Trade* : And the intelligence last mentioned determins the *number* and *sorts* of Ships which are to be *always* in *readiness*. Moreover, the *Kings Navy* must be of Ships *above 600 Tunns*, but need not have *half* so many *lesser* as will suffice in time of *Exigence*, for such may be hired from *Merchants*.

## CHAP. II.

1. OF the *Advantages* scituate upon the *Sea* and *Navigable water*.

2. Of the *benefit* of a *Shipping Trade* in *General*.

3. Of the *Fishing Trade*, and how far the *Subjects* of the *King of England* are able to mannage it, and what have hitherto been the *Impediments* thereof.

4. Whether it were for the *benefit* of the *Commonwealth*, that *Coals* were found near *London* : And that good *Tobacco* and *Sugars* would grow in *England*, for as much as a parcel of proper fitting ground of twelve mile square, would bear as much of these *Commodities* as do now come from *America*.

5. Of



5. Of what benefit to the World is the Discovery of new Countries, new Passages, new Mines of Gold, of Silver, and of the Longitude it self.

6. What increase of Trade doth really signifie and import.

7. The effect of depending upon forraign Countries for Hems, Tarr, Masts, Rozin, and Sail-Cloath.

8. Of the whole Expence of a Fleet, how much of that from forraign Countries, and how much is the Domesticke in value.

9. The same English men who now work upon exported Commodities, as woollen Manufactures, Lead, Tinn, &c. did go to Sea in Men of War. Quer. Whether they would not take as much Commodities by way of Prize, as they now receive in Exchange for their said Exportations.

10. Of the Decay of Timber in England, Scotland, and Ireland, with the Causes and Consequences, and Remedies thereof.

### CHAP. III.

1. Whether Landmen and not Seamen bred, be fitter to Command at Sea.

2. Of all the Men in a Fleet of War, how many ought to be perfect Seamen, how many of five lower degrees, and how many may be Landmen.

3. How, in what time Land Soldiers, and other Tradesmen of labour may be made Auxiliary Seamen, and how many such may be requisite in Cases ordinary and extraordinary, and how the said Men may be encouraged and employed at Land to the publick benefit.

4. Of allowing encouragement to Impotent Seamen, with the number of them, and how to assist such Seamen as are low of employment.

OF

# OF NAVAL OECONOMY or HUSBANDRY.

## The Third PART.

**H**AVING determined the *number* of the Tuns of Shipping of which the *whole Navy* is to consist, and *how many Ships* in number they ought to be ; as also *how many* of each *size* and *rate*, and in what and *how many Harbours* they are to be kept, so as to be ready to put to Sea upon any Occasion : it remains to set forth *how* the same may be done with the *least Charge*, and with the *least Expence* of *foreign Commodities*, to which purpose the following particulars are to be considered.

1. Forasmuch as a *Ship* doth commonly Reign about thirty years, it follows, that the 30th. part of Tunns of Shipping, of which the *whole Navy* consists, must be new built every year, the which may probably cost 15 l. Ann. with Gunners, Boatswains, and Carpenters stores.

2. The Charge of the *English Navy* in ordinary has by experience amounted to 20 s. per Tunn, per Annum.

3. For charge of maintaining a Man of Warr at Sea, completely fitted, victualled, and manned, with the expence, wear, and tear of all manner of stores, doth amount to 24 l. per Ann.

4. There are *Estimates* by which Money must be provided for the use of the *Navy*, but by good husbandry the Charge may be defrayed at a more easie Rate ; wherefore we shall in the next place describe Historically the present way of managing his Majesties *Navy* in *England*, and afterwards make some animadversions upon each of the three great branches of that *Expence*, which is *Wages*, *Victuals*, and *Stores*, subdividing each of them again into several other branches as the Nature of the thing and Custom requires.

F I N I S.



# A S U R V E Y OF THE

Buildings and Encroachments on the River of *Thames*, on both sides, from *London-Bridge* Eastwards to the lower end of *Lyme-house*: Taken by the Principal Officers and Commissioners of his Majesties Navy, with the Assistance of the Elder Brethren of *Trinity-house*, in pursuance of an Order of the Right Honourable the Lords Commissioners for Executing the Office of Lord High Admiral of *England*, Dated the First of *March*, 168 $\frac{3}{4}$ . Wherein is also particularly expressed which of the said Buildings and Encroachments are *Old*, and which are *New*, and likewise which of them are judged most prejudicial to Navigation and the River; together with References to each of them by Numbers in the Draught of the River lately made by Captain *Collins*.

*On the South-side of the River, from  
London-Bridge, Eastward.*

Numbers  
in the  
Draught.

## Buildings and Encroachments.

### Dimensions.

	Feet from East to West.	Feet out into the River.	Old or New, and which prejudicial.
1 <b>A</b> T <i>Allen's Dye-house</i> a Pott Gallery — — — — —	21	12	Old
A Pair of Stairs — — — — —	21	12	Old
2 Mr. <i>Cholmley</i> the Brewer, a pair of Stairs — — — — —	100	9	Old
3 Mr. <i>Gibbs's</i> Wharf on the East-side <i>Pickleherring-stairs</i> — — — — —	14	15	Old
4 A Pott Gallery upon the West-side of <i>Still-stairs</i> — — — — —	90	5. 6. 7. 8. 9.	Old
5 A Pot Gallery to the West of <i>Wheeler's-yard</i> — — — — —	85	9	Old
6 <i>Stephen Matthews</i> , alias Mr. <i>Lewsley's</i> Wharf — — — — —	40	3	New
7 From the West End of Mr. <i>Cundy's</i> Wharf to the West End of Mr. <i>Boddy's</i> Yard — — — — — }	200	5	New
8 From the West end of <i>Cundy's</i> Wharf to the East of <i>Philip Castney's</i> Wharf	37	W 3 E 23	New
9 Mr. <i>Partridge's</i> Wharf — — — — —	35	W 20 E 2	New
10 <i>St. Saviours Dock</i> , Mr. <i>Veering's</i> Timber-Yard — — — — —	110	E 5	New
11 Mr. <i>Heyden</i> , junior, alias <i>Collins's</i> Yard — — — — —	40	W 5 E 28	New
12 Mr. <i>Heyden</i> , senior, his Launch — — — — —	50	W 30 E 3	New
13 From Mr. <i>Stephens's</i> House to the Stairs at the West-end of his Yard	127	5	New
14 Mr. <i>Stephens's</i> Houle and Wharf — — — — —	40	W 4 E 5	New
15 <i>Thomas Huggins's</i> Yard — — — — —	100	W 25 E 4	New



Numbers  
in the  
Braught.

# Buildings and Encroachments.

	Feet from East to West.	Feet out into the River.	Old or New, and which prejudicial.
1 <b>A</b> T Allen's Dye-house a Pott Gallery — — — — —	21	12	
A Pair of Stairs — — — — —	21	12	Old
2 Mr. Cholmley the Brewer, a pair of Stairs — — — — —	100	9	Old
3 Mr. Gibbs's Wharf on the East-side <i>Pickleherring-stairs</i> — — — — —	14	15	Old
4 A Pott Gallery upon the West-side of <i>Still-stairs</i> — — — — —	90	5.6.7.8.9.	Old
5 A Pot Gallery to the West of <i>Wheeler's-yard</i> — — — — —	85	9	Old
6 Stephen Matthews, alias Mr. Lewsley's Wharf — — — — —	40	3	New
7 From the West End of Mr. Cundy's Wharf to the West End of Mr. Boddy's Yard — — — — —	200	5	New
8 From the West end of Cundy's Wharf to the East of Philip Castney's Wharf	37	W <sub>3</sub> E <sub>23</sub>	New
9 Mr. Partridge's Wharf — — — — —	35	W <sub>20</sub> E <sub>2</sub>	New
10 St. Saviours Dock, Mr. Veering's Timber-Yard — — — — —	110	E <sub>5</sub>	New
11 Mr. Heyden, junior, alias Collins's Yard — — — — —	40	W <sub>5</sub> E <sub>28</sub>	New
12 Mr. Heyden, senior, his Launch — — — — —	50	W <sub>30</sub> E <sub>3</sub>	New
13 From Mr. Stephens's House to the Stairs at the West-end of his Yard	127	5	New
14 Mr. Stephens's House and Wharf — — — — —	40	W <sub>4</sub> E <sub>5</sub>	New
15 Thomas Huggins's Yard — — — — —	100	W <sub>25</sub> E <sub>4</sub>	New
16 William Ebbins's Wharf — — — — —	35	W <sub>2</sub> E <sub>16</sub>	New
17 West of Three-Mariners-stairs — — — — —	68	W <sub>3</sub> E <sub>6</sub>	New
18 Mr. Castle's, alias Narbrough's Yard — — — — —	80	W <sub>5</sub> E <sub>27</sub>	New
19 Mr. Stephens's House — — — — —	35	7	New
20 Mr. Eldridge's Wharf — — — — —	100	8	Old
21 From thence East to Redriff-Bite — — — — —	40	E <sub>23</sub>	Old
22 From East-side of Redriff-Bite to the West of Church-Wharf — — — — —	400	W <sub>20</sub> E <sub>2</sub>	Old
23 From the West-side of Captain Bowers's House to the East-side of Mr. Whittingham's — — — — —	152	W <sub>15</sub> E <sub>36</sub>	New
24 From the Crane against Redriff-Church-steeple to the East-end of Slightfoot's House — — — — —	130	W <sub>28</sub> E <sub>16</sub>	Old
25 Mr. Brownloe's Wharf — — — — —	26	E <sub>8</sub>	New
26 Captain Wardlow's House — — — — —	35	34	New, prejudicial
27 From the East-end of Captain Wardlow's to the West-end of Farren's	600	10	Old
28 Mr. Farren's Timber-Wharf by Russel's Powder-Mill — — — — —	50	10	Old
29 From Farren's to the Powder-Mill-stairs — — — — —	100	8	Old
30 The Yard in the Possession of Sir William Warren is — — — — —	75	20	New
31 Sir Thomas Gold's Yard, in the Possession of Grassingam and Collins — — — — —	200	100	Old
32 Mr. Glyde's Wharf — — — — —	100	11	New
33 Mr. Kirby's Yard — — — — —	102	11	New
34 From the West-side of Rolfe's Yard to the West-side of Globe-stairs	175	11	New
35 The Merchants Plank-Wharf on the East-side of Globe-stairs — — — — —	60	W <sub>8</sub> E <sub>25</sub>	New
36 Mr. Shishes Yard and Dock — — — — —	222	25	New
37 Major Borne's Wharf to the East of Mr. Shishes Yard — — — — —	25	25	New
38 Shepherd and Dogg-stairs — — — — —	200	W <sub>10</sub> E <sub>5</sub>	New
39 From the Shepard and Dogg-stairs Eastward — — — — —	80	5	New
40 From the West of Mr. Hunt's Gun-wharf to the West of Mr. Hill's Timber-yard — — — — —	160	8	New
41 Mr. Hunt's Gun-Wharf — — — — —	72	8	New
42 Next Wharf to Mr. Walraven's Wharf — — — — —	18	9	New
43 Mr. Walraven's Wharf at the Sign of the Kings-Head — — — — —	20	3	New
44 From the West-side of the Rape-Mill Westward — — — — —	100	25	New

On the North-side of the River, from  
London-Bridge Eastward.

Numbers  
in the  
Draught.

## Buildings and Encroachments.

### Dimensions.

Feet from East to West.	Feet out into the River.	Old or New, and which prejudicial.
20	8	New
12	8	New
	100	very prejudicial
620	8 & 10	Old
8	6	Old
46	10	Old
60	10	Old
21	7	Old
22	8	Old
12	10	Old
30	12	Old
15	10	Old
40	8	Old
8	8	Old
	100	prejudicial
28	3	New
18	12	New, prejudicial
	6	New
120	6	New
	110	prejudicial
35	5	Old
20	6	Old
68	15 2	Old
	105	prejudicial
25	8	Old
710	20	Old
	120	prejudicial
70	14	
	120	
162	23	{ New, very prejudicial. prejudicial prejudicial
72	37	
190	E 23	
	100	
240	W 17 E 27	New, very preja
200	W 17 E 23	New
32	13	New
25	12	Old
140		Old

- 1 { **B** Illinsgate, Smart's Key, from the Corner up into the Dock, —
- And from thence Eastward — — — — —
- 2 Iron-Gate, a Caulway — — — — —
- 3 St. Katherines, from Iron-Gate towards St. Katherines Dock are Pot }  
Galleries — — — — — }
- 4 Mr. Babbington's Wharf — — — — —
- 5 Mr. Butterfield's Wharf — — — — —
- 6 From Mr. Butterfield's to Ship-Brew-house a Pot Gallery — — —
- 7 John Parson's Wharf — — — — —
- 8 Thomas Harvell's Pot Gallery — — — — —
- 9 John Gulick's Pot Gallery — — — — —
- 10 The Widdow Pardy's Cole-Wharf — — — — —
- 11 Thomas Mallam's Pot Gallery — — — — —
- 12 Mr. Bullock's three Houses Pot Galleries — — — — —
- 13 Mr. John Butterworth — — — — —
- 14 Hermitage a Caulway — — — — —
- 15 William Middleton's Wharf — — — — —
- 16 Robert Partridge, Anchor-smith — — — — —
- 17 Next to him is a Bile about 8 Foot, in which shews all between }  
him and Anderson to be Encroached — — — — — }
- 18 A Jetty on the West-side of Anderson's and the East side of Fife's }  
Pot Gallery, by which it appears that those Wharfs and Buildings on }  
each side of the said Pot Galleries are Encroached — — — — — }
- 19 Mr. Snellgrove's Yard — — — — —
- 20 Wapping Old-stairs a Caulway — — — — —
- 21 From Widdow Moppets Stairs, Eastward — — — — —
- 22 From thence to the West of Mr. White's Launch — — — — —
- 23 From the said Launch to the East-side of White's Yard — — — —
- 24 Wapping New-stairs, a Caulway — — — — —
- 25 Mr. Amos Foord's Wharf — — — — —
- 26 From Mr. Bradley's the Anchor-smith's Wharf below Wapping New- }  
stairs to Mr. Snipe's House — — — — — }
- 27 Wapping-Dock, a Caulway — — — — —
- 28 From the West-side of King Edward's Stairs, East — — — — —
- 29 A Caulway from King Edward's Stairs — — — — —
- 30 Sir William Warren's, the Old Encroachment — — — — —  
the New Encroachment — — — — —
- 31 From Sir William Warren's to New-Crane-stairs — — — — —
- 32 New-Crane, New-Crane-stairs a Caulway — — — — —
- 33 From thence to George King's, a Boat-builders Yard — — — — —
- 34 Mr. Baxter's Yard or Wharf — — — — —
- 35 Henry Goodman's Wharf — — — — —
- 36 From Pellican-stairs, James Foster's Wharf — — — — —
- 37 Vosse's Key — — — — —
- 38 Roberts and Allen's Yard — — — — —



each side of the said Pot Galleries are Encroached ——— )					
19 Mr. Snellgrove's Yard ———	120	6			New
20 Wapping Old-stairs a Caulway ———		110			prejudicial
21 From Widdow Moppets Stairs, Eastward ———	35	5			Old
22 From thence to the West of Mr. White's Launch ———	20	6			Old
23 From the said Launch to the East-side of White's Yard ———	68	15	2		Old
24 Wapping New-stairs, a Caulway ———		105			prejudicial
25 Mr. Amos Foord's Wharf ———	25	8			Old
26 From Mr. Bradley's the Anchor-smith's Wharf below Wapping New- stairs to Mr. Snipe's House ——— }	710	20			Old
27 Wapping-Dock, a Caulway ———		120			prejudicial
28 From the West-side of King Edward's Stairs, East ———	70	14			
29 A Caulway from King Edward's Stairs ———		120			
30 Sir William Warren's, the Old Encroachment ———	162	23			{ New, very prejudicial. prejudicial prejudicial
the New Encroachment ———	72	37			
31 From Sir William Warren's to New-Crane-stairs ———	190	E 23			
32 New-Crane, New-Crane-stairs a Caulway ———		100			
33 From thence to George King's, a Boat-builders Yard ———	240	W 17	E 27		New, very preju
34 Mr. Baxter's Yard or Wharf ———	200	W 17	E 23		New
35 Henry Goodman's Wharf ———	32	13			Old
36 From Pellican-stairs, James Foster's Wharf ———	25	12			Old
37 Vosse's Key ———	140	5			Old
38 Roberts and Allen's Yard ———	70	W 2	E 10		Old
39 Oxenbridge and Allen's Yard ———	60	10			Old
40 Mr. Hill's Gun-Wharf ———	70	4			Old
A Lay-stall 3 Foot, and ready to fall ———		3			
41 Mr. Denn's, alias Buzby and Joyce ———	25	3			Old
42 Bell-wharf Brew-house, with a large Bite going in, Old, ———	84	3			Old
43 Francis Bestwell 3 Posts about ———		6			very prejudicial
44 Mr. Edward Hawkins Pot Gallery ———	35	8			Old
45 { West-side of Trinity-Yard ———	26	18			} Old
{ East-side of Trinity-Yard ———	20	11			
46 Robert Warner's Pot Gallery ———	25	8			New
47 Mr. James Ems Yard, from the East-side of the Launch to the East-side of the Yard ——— }	85	14			New
48 Ratcliff-Cross, Widdow Rooks Wharf ———	80	8			New
49 Mr. Crowder's Pot Gallery ———	45	6			Old
50 From the West-side of Captain Prestman's House to the West-side of Queens-stairs ——— }	56	5			New
51 Queens-stairs, Mr. Rich's a Shipwrights Yard to the East of Queens-stairs	60	2			New
52 From the East of Marshal's House to the East of Cox's Yard ———	41	W 2	E 8		New
53 Lyme-house-Bridge, Mr. Boyce's Yard ———	100	7			New
54 Wats, an Oar-makers Wharf, East of Dick-shore to Mr. Graves's Yard	54	30			Old
55 Thomas Graves's Yard and Dock ———	180	W 9	E nil		Old
56 John Graves a Shipwrights Yard ———	200	50			Old
57 From the Crane in the Possession of Mr. Margate to the Stairs by the Blew-Anchor ——— }	150	6			New
58 Edward Gray's Wharf, from the Blew-Anchor to the East-side thereof	410	W 26	E 9		New

Navy-Office,  
30 Octob. 84.

R. Haddock. J. Tippetts. J. Narbrough. J. Sothern. Sam. Chamblet. Simon Nichols  
Henry Teddeman. Thomas Brown. Isaac Woodgreen. John Hill. Thomas Collier  
Nich. Kerrington. Henry Mudd. William Green.